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AND

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CONDUCTED

BY W. NEWTON,

CIVIL ENGINEER AND MECHANICAL DRAFTSMAN.

(Assisted by several Scientific Gentlemen.)

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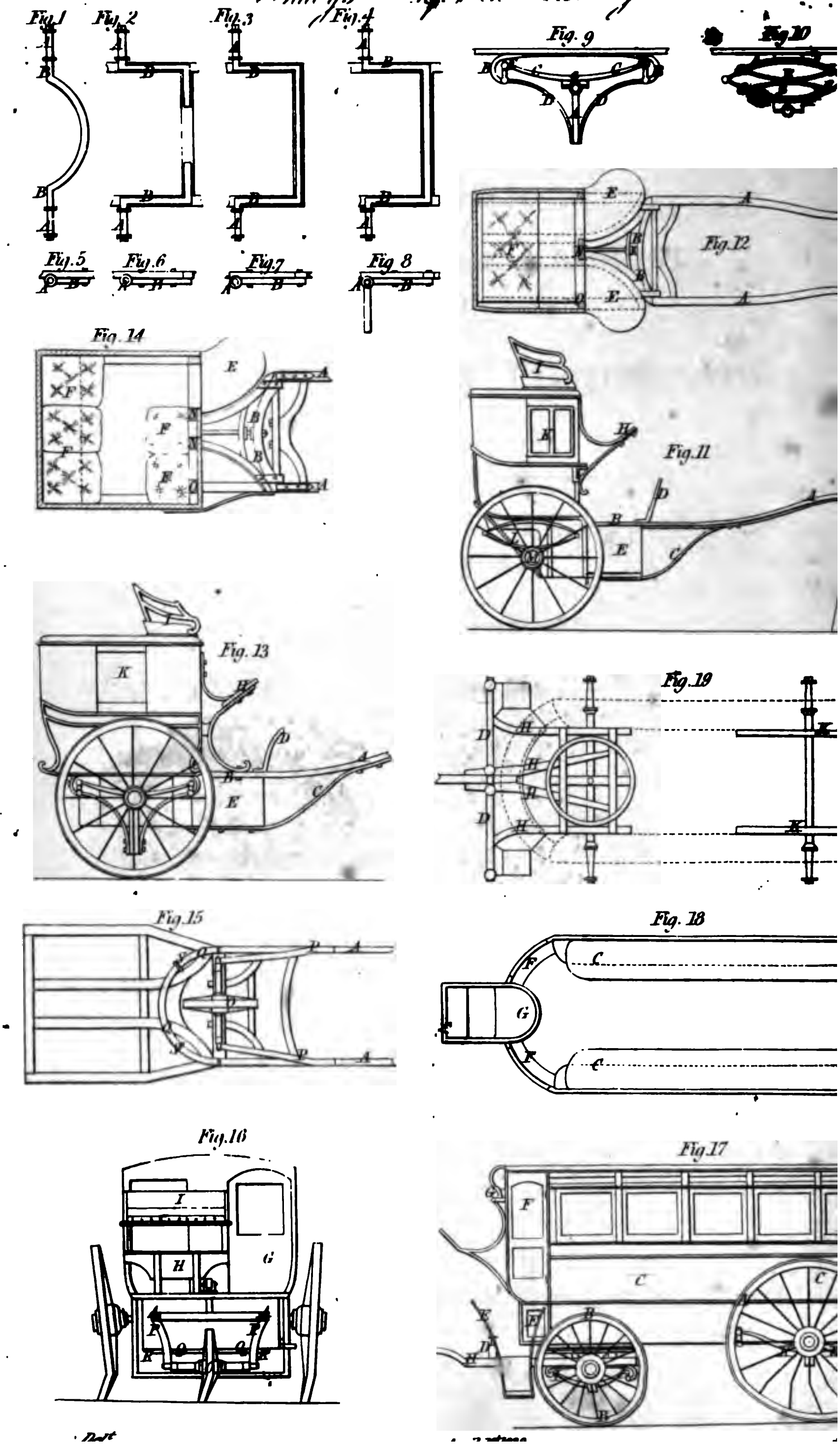
Braby's Impt. in Carriages



THE

London

JOURNAL AND REPERTORY

OF

Arts, Sciences, and Manufactures.

CONJOINED SERIES.

No. LXXIII.

Recent Patents.

To JAMES BRABY, *of Duke-street, Stamford-street, in the parish of St. Mary, Lambeth, in the county of Surrey, wheelwright and coachmaker, for his invention of certain improvements in the construction of carriages.*—[Sealed 11th January, 1837.]

THIS invention of certain improvements in carriages, relates to, first, a horizontal cranked axle or axletree, which may be applied to various descriptions of wheeled carriages; secondly, improvements in the construction of springs for wheel carriages; thirdly, improvements in the construction of hackney, stage, and other carriages, either for public or private use; the entrance for the passengers of which is by a door or doors, or openings in front, and with two or three wheels, and to be drawn by one horse or other animal; fourthly, improvements in the construction of public stage carriages or omnibuses, to be drawn by one or

more horses, and with four wheels, and with an entrance or entrances for passengers in front, or before the fore axletree; all these several inventions and improvements in wheel carriages are hereafter more particularly described.

Plate I., figs. 1, to 10, represents the horizontal cranked axletree or axletrees, and springs, constructed according to my improvements; in each of these, the same letters of reference indicate similar parts on these several figures. Fig. 1, is a representation of my horizontal cranked axletree, bent or curved to the segment of a circle; fig. 2, is a horizontal cranked axletree, formed of one part, and bent at a right angle; fig. 3, is a horizontal cranked axletree, formed in two pieces; fig. 4, is a *horizontal* cranked axletree applied to the common *vertical* cranked axletree, which, in some constructions of carriages, may be of great advantage; figs. 5, 6, 7, and 8, are end views of these figures: A, A, is that part of the axle on which the wheels revolve; B, B, the part of the axle to which the shafts or framing of the body is firmly attached. The advantages resulting from using this horizontal cranked axletree, are the facility with which perfect safety may be obtained, by bringing the centre of gravity of the carriage and loading to the lowest point; and I wish it to be understood, I do not confine my invention or improvement of the above axletrees to the perfect horizontal position of them when attached to the carriage, but only so far as that they shall not deviate more than the angle of forty-five degrees from the horizontal position; neither do I confine myself to any particular form of curve or angle of the crank of the said axletrees.

Fig. 9, is a side view of my improved construction of springs to be applied to the common cranked axletree: A, A, the vertical or cranked part of the axletree; B, B, scroll irons of the usual construction attached to the framing of the carriage; C, C, is a spring of one or more plates

of steel, firmly fixed to the axletree at *a*, and attached at the ends to the shackles E, E; D, D, are two curved springs, fastened, by bolts or otherwise, to the lower part of the cranked axletree, and attached at the other ends, by bolts or otherwise, to the scroll irons B, B. The only novel parts in the above described spring, and which I claim as my invention, are the two curved springs D, D. The advantages resulting from the use of this improvement is, that the spring so constructed is intended to vibrate equally with a light as with a heavy weight.

Fig. 10, is a side view of my improved construction of double curved springs: A, A, are the external springs, formed of one or more plates of steel, and attached together as in common; B, B, two inner springs, firmly rivetted or fastened together in the centre, and may be made of one or more plates of steel; and the ends of which inner springs press on the inside of the external springs at C, C, and are fastened thereto in any convenient manner, so as to allow a slight degree of sliding motion: the advantages resulting from the use of this description of spring are the same as those described as relating to fig. 9.

Figures 11, 12, 13, and 14, represent my improvements in the construction of one horse, hackney, stage, and other carriages. Fig. 11, is a side view or elevation; fig. 12, sectional plans of the interior, showing the shafts and framing by which they are attached to the centre framing of the body; the same letters of reference are used in each figure: A, A, are the shafts, attached by joints of wood, iron, or other material, to the framing B, B, so as to allow of a slight degree of motion for the play or elasticity of the springs C, C; the framing B, B, is firmly secured to the front framing N, N, of the body; and the springs C, C, are bolted, or otherwise fastened, to the under side of the shafts, and to the under side of the bottom framing of the

body or entrance step: the object of these springs is to prevent the motion of the horse being communicated to the body of the carriage, and to render the vehicle perfectly easy: D, is a guard iron (commonly called a dashing iron), made of wood or iron, covered with leather or any other materials, and protects the passenger from the horse, or any dirt arising therefrom; E, E, are landings, platforms, or steps, leading to the interior, and fastened to the bottom framing or timbers of the body; F, seats for the passengers; G, G, doors, extending from the bottom framing to the top, at the discretion of the builder, and may be made with or without openings, glasses, or curtains; H, foot-board for the driver, and I, his seat; K, side openings or windows, fitted with glasses or not; L, common elliptic springs, fixed in the usual way; but springs of any other description may be used: M, M, a common or other straight axletree passing under the seat, allowing sufficient room for the action of the springs.

As it may be desirable that the above described vehicles should have only one door in front, instead of two, the front framing, shafts, &c. would then be constructed similar to that shown in figs. 13, and 14, that is, attached partly to the centre framing N, N, of the body, and partly to the side framing O, O.

I do not confine myself to any particular shape or form of the body, springs, or axletree in the said invention; but what I claim as my invention, with reference to that part of my improvements in wheel carriages, delineated in figs. 11, 12, 13, and 14, is a two-wheel public stage, or hackney-carriage, intended to carry two or more passengers, and having an entrance or entrances in front, with the shafts attached to the centre framing of the body, and which framing or timbers is connected with the top and bottom framing of the body; and if with only one entrance,

to be attached partly to the centre timbers as before described, and partly to the side framing of the body.

Fig. 15, represents my improved one-horse public conveyance, stage, or hackney conveyance, constructed with three wheels, the body, springs, axletree, &c. being similar to that shown in fig. 13; and the same letters of reference being used: I have only to describe the application of the fore wheel; O, is the front wheel, turning by its axle in the two side springs P, P, which springs are firmly fixed to the shafts A, or to the ends of the jointed sweep iron Q, Q, see fig. 15, which is an under-side view of the locking carriage. The sweep iron Q, passes under the landings or platform E, at R, and is kept in its place by the staples S, S, allowing a free sliding motion, so that the wheel O, may be turned at the required angle to the other wheels; any other mode of locking or mounting the fore wheel may be adopted. What I claim as my invention, is the application of a wheel in front to a public carriage, with entrance or entrances in front, and as before described.

Fig. 17, is a side elevation; fig. 18, is a sectional plan of the interior, showing the seats for passengers; fig. 19, plan of the fore and hind carriages, the dotted lines showing the situation of the body. In this improved public conveyance or omnibus, the door or doors, and entrance or entrances for passengers is in front, or before the fore axletree: A, A, are the hind wheels; B, B, the fore wheels; C, C, the body, with seats on each side for the passengers; D, is the splinter bar, and by which the horses draw the carriage. The splinter bar is framed at such a distance from the fore wheels B, B, as to allow of steps, with necessary protection by guard-irons F, F, from the wheels or horses, and by which steps or landings the passengers enter and leave the vehicle; G, G, is the seat and foot-board for the driver, which is so arranged that he may readily open or close either of

the doors, and take money from the passengers; H, H, futchells or guides connecting the fore axletree with the splinter bar; I, I, the fore springs; K, K, hind springs.

The body may be made of any suitable shape, and the arrangements of seats for passengers is at will of the proprietor. The only parts that I claim as my invention with reference to that part of my improvement, delineated in figs. 17, 18, 19, is a four-wheel public stage, carriage, or omnibus, with one or two entrances in the front of or before the fore axletree, to be drawn by one or more horses, and to carry a number of passengers. The advantages resulting from the adoption of this improvement, are of great convenience to the public in entering or alighting from this description of carriage, in consequence of the steps coming close to the curb stone or side of the road; and the advantage offered to the proprietors in the saving of the wages of the conductor whose services are not required, and also preventing the annoyance to passengers from the poles or horses of other carriages coming against or in the way of the doors in entering or alighting.—[*Inrolled in the Rolls Chapel Office, July,* 1837.]

To JOSEPH MORGAN, *of Manchester, in the county of Lancaster, pewterer, for his invention of certain improvements in the apparatus used in the manufacture of mould candles.*—[Sealed 22d May, 1834.]

THE nature of these improvements in the apparatus used in the manufacture of mould candles, consists in the construction and arrangement of certain machinery or apparatus by which the manufacture of mould candles is greatly facilitated, and the labour or manual labour required in this manufacture greatly decreased; and the manner in

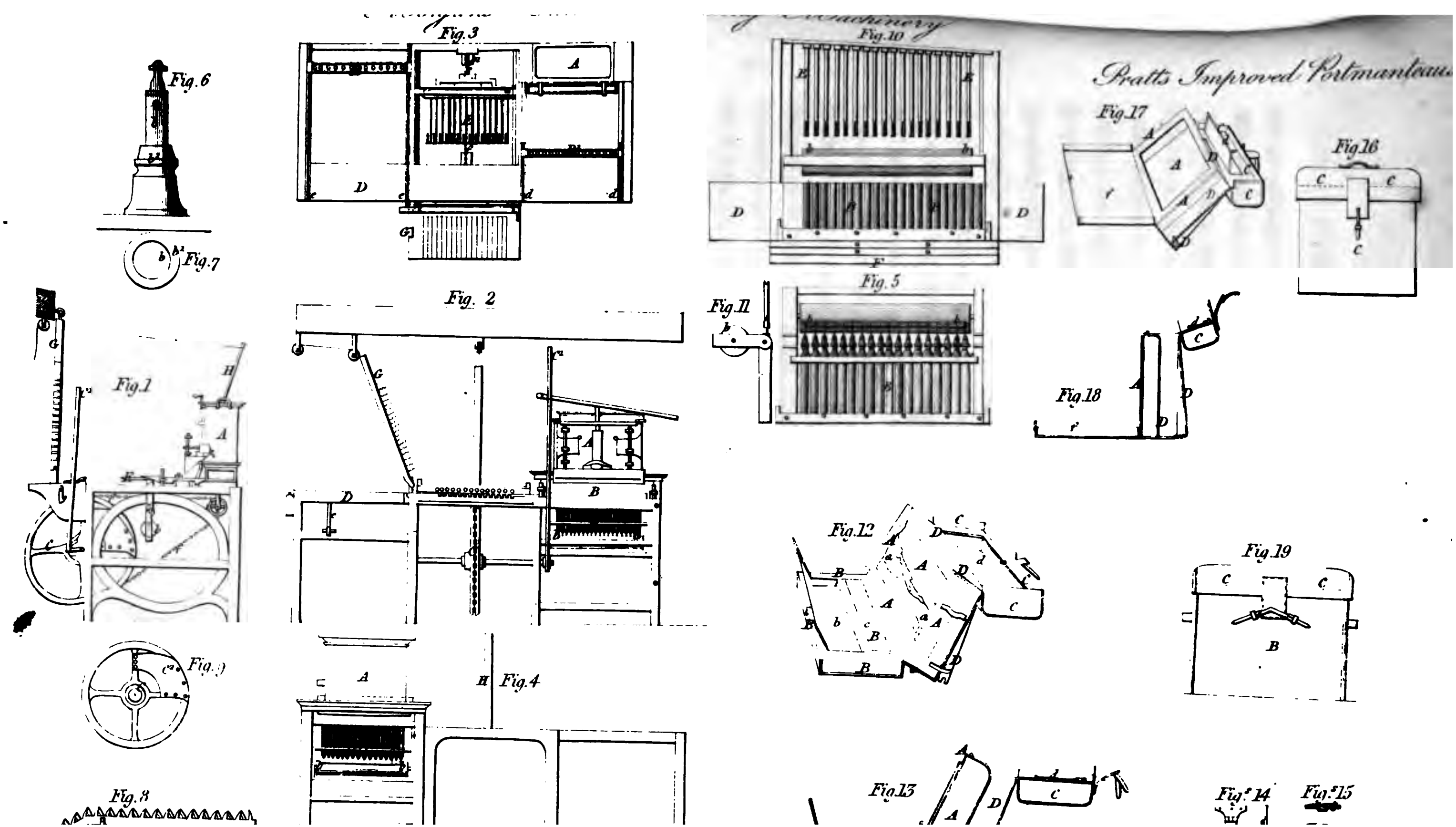

Pratts Improved Portmanteaus
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Fig.s 14
Fig.s 15
Fig.16
Fig.17
Fig.18
Fig.19

which the same is performed or carried into effect, will be more fully seen by reference to Plate II., and the following description thereof, the same letters and figures of reference indicating the same parts throughout the whole of the figures:—

Fig. 1, represents an end elevation of my improved apparatus; fig. 2, a front view, and fig. 3, a plan of the same; fig. 4, is an elevation seen from the back of the apparatus, in the opposite direction to that represented at fig. 2. In these figures, A, represents the vessel or reservoir in which the melted tallow or other material is contained for making the candle, and B, represents a series of moulds, in which the tallow or other material is received for forming the candle in the usual manner; but the arrangement and construction of these moulds in which the candles are formed, varying from those of the ordinary construction: this part is shown on an enlarged scale at fig. 5, and some of the detached parts on a larger scale at figs. 6, and 7. In fig. 5, *b*, *b*, represents a hollow tin cylinder, which opens longitudinally, and is provided with a number of warves or bobbins of cotton or other wick, to correspond with the number of moulds which are to be supplied; these warves or bobbins revolve freely on a wirl or shaft, which passes the whole length of the cylindrical case *b*, *b*, and gives off the cotton wick as it is required for the formation of the candles, as hereafter explained.

Fig. 6, represents an elevation of the upper end of one of the cylindrical moulds, as shown at B, in the other figures; and fig. 7, a plan view of the same, shown in an inverted position, so that the interior of the mould is there represented. In these two figures, 6, and 7, it will be remarked that the top is not constructed in one piece, as in ordinary moulds, but consists of the part *b* 1, which is part of the cylindrical side of the mould, and the part *b* 2, which

is a sliding or moveable part. This last or moving part b is hollow, for the wick to pass through, and fits close to the part b 1, when the tallow or other material is poured into the mould to form the candle; but as soon as the candle is cold, and in a condition to be removed from the mould, instead of pulling it out in the ordinary way, I am, by this arrangement, enabled to force the candle out by pressure applied to the extremity of the part b 2, through which the wick passes from the cylindrical case b, b, and the wick which passes out by a hole in the side of the part b 2, following the course of the candle as it is forced from the mould, re-cottons the mould for a succeeding candle, as will be seen hereafter.

Fig. 8, represents a series of nippers or pincers, which open and shut together by the action of the lever C; and these nippers are for the purpose of holding the wick at the opposite end of the mould to that at which it enters at the hole in b 2, in a perpendicular and antrical position in the mould at the time when the tallow or other material is introduced.

Having described the separate and detached parts of my apparatus, as represented at figs. 6, 7, and 8, I shall proceed to describe the process on which I proceed in the manufacture of candles by this apparatus. Supposing a frame, or set of moulds, as represented at B, to have wicks carried through each mould, or regularly cottoned, and each wick to be held accurately in the centre of the mould by means of the series of nippers shown at fig. 8, the moulds are first taken to the position shown at B 1, figs. 2, 3, and 4, where they are supported in a perpendicular position on the small straight edges or railway d, d, as seen at fig. 3. In this position they are run forward until they come perpendicularly under the reservoir A, where the tallow, or other material of which the candle is to be com-

structed, is applied in the usual manner. The candles being in this state, the moulds are run along on the railway *d, d,* under the reservoir A, to any convenient position which the railway may be conducted to, where they remain until they are sufficiently hardened to be taken from the moulds, at which period the nippers shown at fig. 8, are removed. When the candles are hardened, the moulds are brought to the position shown at B, fig. 3, where they are placed on a similar railway to that shown at *d, d,* on the other side of the machine. Here they are pushed forward in the direction indicated by the black arrow, till they arrive at the hanging table D, which vibrates on the joint *e, e,* and is then let down, but immediately returned to the longitudinal position by the operator, carrying along with it the frame of moulds B, in which position it is held by a catch, shown at *e* 1, in fig. 2; from the horizontal position shown at D, in fig. 3, the moulds B, are removed in the direction of the dotted arrow, until they arrive immediately opposite the series of rammers E, as shown separate at fig. 10, where the cylindrical case *b, b,* is removed by the binding the jointed frame, as seen at fig. 11, to be out of the way of the rammer E.

This series of rammers E, moves freely in an horizontal direction, supported on straight edges at each extremity, and is actuated or moved by the partial rotation of the wheel C, as represented at fig. 1, where *f,* represents a band or chain passing over its periphery, and round the guide pulley *f* 1. This chain or band *f,* is attached to the series of rammers E, so that any vibration of the lever *c* 1, which is fixed on the axis of the wheel C, is imparted to the rammers E, in an horizontal direction. The moulds being in the position shown at fig. 10, the next duty of the operative is to vibrate the lever *c* 1, in the direction of the arrow at its extremity, see fig. 1, and thereby force the series of

rammers E, into contact with the sliding part *b* 1, of each of the moulds, and thereby displacing or pushing out the amount of candles which are received into the grooved table F, which is raised up to the exact position to receive them by the action of the scroll piece *c* 2, attached to the wheel C, and on which the grooved table F, is supported. The candles being thus forced from the moulds by the action of the rammers, are immediately secured and held stationary by depressing the lever G, which is provided with a series of like number of small convex pieces of pewter, formed of a section of the candle mould, which are attached to slight springs, as seen at fig. 2; this lever is held down by a small catch. From what has been said of the frame of mould B, it is obvious that the same action of the rammers E, which displace the candles, will carry down to the moulds a fresh supply of wicks for the succeeding candles; and at this period, while the finished candles are secured on the table F, the nippers shown at fig. 8, must be re-applied, after which the finished candles are cut off and disposed of.

The next duty of the operative is to replace the lever *c* 1, in the position shown at fig. 1, which retires or carries back the rammers E, along with the sliding top of the moulds 2 *b*, to their former position, and the moulds are cottoned or wicked ready for a fresh supply of tallow or other material.

This series of rammers, shown at E, are formed of separate hollow tubes supported in the cross piece *g*, *g*, each of which tubes are provided with a small spring having a slight projection on its inside, by means of which, when the rammers are pressed against the sliding part of the moulds marked 2 *b*, the spring gives way and catches firm hold of the notched part, as shown at fig. 6, and is thereby enabled to bring it back to its former position, when the candles are forced from the moulds as soon as the rammers are re-

tired, and have brought back the sliding tops 2 *b*, of the respective moulds, the springs at their extremity, which had held the part 2 *b*, as already described, are relieved or lifted up by a second series of rammers or rods, which pass up the interior of the hollow rammers, as already described.

These second series of rods are fixed in a similar cross piece marked *h*, *h*, in fig. 3, which, as soon as the rammers are retired from the moulds, is forced forward by means of the lever H, and thereby the caps 2 *b*, and the whole of the moulds marked B, freed from any connexion with the rammers E. At this period the moulds are passed forward to the railroad *d*, *d*, and replaced in the position shown at B 1. The tallow from the reservoir A, again supplied to them, and the process already described repeated to any number of times.

From what has been said of the construction of my apparatus and method of operating, it will be seen that with a sufficient number of frames of moulds, to allow the moulds to cool, the action of this machinery or apparatus may be continued for any period which may be required, and much labour saved, which is expended in the ordinary process, in addition to which the waste of candle-wick is entirely obviated.

Having described the nature of my invention, and the manner in which the same is to be performed and carried into effect, I hereby declare that I do not claim any separate or well-known part of the apparatus or machinery by which my invention is performed and carried into effect; but I do claim the general arrangement of such parts of machinery by which I am enabled to replace fresh wicks of cotton or other material in the moulds at the same time, and by the same action as that which forces the candle out in the direction already described; which effect is more particularly produced by the peculiar construction of the

sliding part represented and described at figs. 6, and 7, which, together with the general arrangement of the whole apparatus, being, to the best of my knowledge, new, and never before used, I hereby declare this is my true and faithful specification of the same.—[*Inrolled in the Inrolment Office, November*, 1834.]

To Samuel Pratt, *of Peckham Rye, in the county of Surrey, gentleman, for his invention of certain improvements in the construction of knapsacks, portmanteaus, bags, boxes, or cases for travellers.*—[Sealed 9th December, 1836.]

This invention consists in certain novel constructions, arrangements, or combinations of the parts or compartments of knapsacks, portmanteaus, bags, or cases, by means of which a more convenient and useful travelling commode is obtained than has hitherto been made, possessing the several advantages of a knapsack, portmanteau, or case and bag combined together, and whereby the convenience of keeping different articles of dress separate one from the other is obtained; for instance, the outer garments for a gentleman is separated from his linen, or inner apparel, as well as distinct compartments for papers, drawings, books, toilet utensils and brushes, or other articles; and also a separate bag or compartment for dirty linen, boots and shoes, or such other parts of dress which it is desirable to keep distinct from clean linen or other apparel.

With these improved constructions of travelling portmanteaus, knapsacks, or bags, any article for dress or other purpose can be obtained at once, without the necessity of taking out, tumbling over, or disarranging the whole con-

tents of the portmanteau, knapsack, or commode: and, more particularly, the inconvenience of having the contents of the portmanteau, knapsack, case, or bag, disarranged by Custom-house officers, in passing from one country to another, is obviated, as each compartment in this improved construction of knapsack, portmanteau, or case and bag is intended to contain its appropriate articles, which may be easily searched or looked over without disarranging the contents.

Plate II., fig. 11, is a front elevation of one of the improved constructions of portmanteaus, knapsacks, or bags, as it would appear when closed and locked ready for travelling; fig. 12, is a transverse vertical section taken through the portmanteau, knapsack, and bag, about the middle; fig. 13, represents, in perspective, the commode thrown open, and its interior displayed.

It will be perceived that this travelling commode, portmanteau, knapsack, and bag, consists of four distinct parts, viz. the main body of the portmanteau A, which is intended to carry the woollens or larger part of the outer garments for a gentleman, or the dresses of a lady, and is furnished with a curtain or flap cover *a*, fastened by a turn button, or in any convenient manner; the front part B, is divided into one, two, or more compartments, as *b*, and *c*, each furnished with a flap cover, fastened by a turn button, and intended to contain linen or small articles of dress, brushes, or papers; the top part C, which has also one or more compartments, covered with the flap *d*, fastened by turn buttons; and, lastly, the dirty linen, or boot and shoe bag, or compartment D, which is situate behind the main compartment A, and is flexible, capable of being more or less distended by its contents, and is confined to its smallest size by a strap and buckle *e*, or by a spring catch, as shown de-

tached on a larger scale at figs. 14, and 15, which fastening is secured by means of a rack and pin in the socket part.

The whole of this portmanteau, knapsack, or travelling commode, is constructed in the usual manner, well known to trunk or travelling equipage makers; and the outside of the bag may be protected by a framing of iron, covered with leather, if thought desirable, which will keep it in proper shape with the portmanteau.

Figs. 16, 17, and 18, are similar representations of another of my improved constructions of commode knapsacks or portmanteaus, which consist of but three compartments, viz. A, C, and D; the front compartment B, being in this instance dispensed with, and its place supplied by the cover or flap *f*; for the main body or compartment of the portmanteau, the other parts are similar to the foregoing; and as the same letters of reference are marked upon corresponding parts, no further description will be necessary.

Having now described my improved constructions, arrangements and combinations of the parts or compartments of the travelling commode, portmanteau, knapsacks, cases, or bags, I wish it to be understood that I do not mean or intend to claim as my invention, any of the several parts or compartments separately, as they have been heretofore used in common; but that which I claim as my invention is the construction, combination, and arrangement of the bag, portmanteau, knapsack, or case together, forming a travelling commode, portmanteau, knapsack, or bag, possessing the advantages set forth in the former part of this my specification.—[*Inrolled in the Rolls Chapel Office, June,* 1837.]

Specification drawn by Messrs. Newton and Berry.

To THOMAS TAYLOR, *of Banbury, in the county of Oxford, saddler and harness-maker, for his invention of certain improvements in saddles for riding.*—[Sealed 7th May, 1836.]

THIS invention of improvements in the construction of saddles, consist of two separate improvements, the first of which is the adaptation of air-tight bags in place of the ordinary padding for the seats and flaps of saddles. The second consists in fastening or attaching the upper and fore part of the saddle to the panel or padding. This second part of the invention is, however, not very clearly described by the Patentee, we shall, however, endeavour to give our readers as correct an idea of the invention, as the obscure nature of the latter part or description will admit of.

In Plate III., figs. 4, and 5, represent two different views of the saddle with the first part of the improvements attached thereto. Fig. 4, is a side view of the saddle complete, the air bags being shown by dots; fig. 5, is a plan view of the saddle without the leather covering, and shows the position and shape of the air bags. It will be seen in fig. 5, that there is a division of the air bags *a, a,* at *b*; this is to prevent any communication between them, as the effect of any communication would be a tendency to throw the rider from his seat.

The Patentee states that these air bags are to be made of that sort of waterproof fabric that is made under a patent granted to a Mr. Macintosh, which consists of a thin sheet of India-rubber cement, covered on both sides by a woven fabric. The air bags are filled with air from behind through the medium of small cocks *c, c*; and the bags are retained in their proper position by means of long stitches.

The second part of the invention consists in attaching the fore part of the saddle to the panel or padding, by

means of screws going through the upper part of the saddle, and screwing into nuts in the panel, instead of fastening them together by means of nails, as is usual, the hinder part of the upper part and padding of the saddle are attached together by means of plates having an hinged joint.

The Patentee states that the advantage derivable from this part of the invention is the facility with which the upper part of the saddle may be detached from the under part. The Patentee says in conclusion, what I claim as my invention, secured to me by the present Letters Patent, is, first, the application of air-tight bags, as a substitute for the ordinary elastic packing or padding of the seats or flaps of saddles, as above described; and, secondly, in the attaching the fore part of the saddle to the panel or under packing by means of screws and hinged plates, as above described. —[*Inrolled in the Inrolment Office, November,* 1836.]

To WILLIAM RANGER, *of Great Dean's-yard, in the county of Middlesex, builder, for his invention of certain improved modes of preparing and combining various materials, whereby the moulding or forming blocks, casts, walls, or other aggregates in those said materials, may be considerably expedited, being improvements upon a patent granted to him for Ranger's Artificial Stone.*—[Sealed 4th December, 1834.]

THE Patentee commences his specification by saying that, in the specification of his former patent, he employed hot water as a means of speedily producing the crystallization of the lime, but that since that time he has found by experience that the said crystallization or concreting action is very considerably increased, expedited, and facilitated by

heating the siliceous or other materials. The heating of these siliceous materials, is effected either by placing them upon iron plates, having flues underneath, in a manner somewhat similar to a chemist's sand-bath, or by any other methods well known and in use, that will accomplish the object desired. The Patentee also states, that in order to ensure the more uniform compactness and solidity of the artificial stone or cement, he has found it desirable to enclose it in boxes or moulds, not only closed at the bottom and all the sides, but also closed at the top, and secured firmly by means of screws and nuts, or in any other proper manner, in such a way that the position of the boxes or moulds may be changed in any manner thought desirable, while the materials enclosed within the said moulds are crystallizing or concreting.

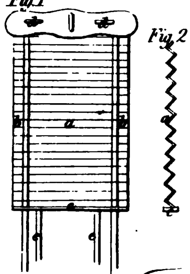
The Patentee further observes, that it is also necessary that the lime should be in its most caustic and perfect state, and contain as little as possible of carbonic acid. In order to consolidate walls and other aggregates that are not liable to be changed in their position while they are being formed, the Patentee covers the materials over with loose planks, loaded heavily with weights that must be distributed uniformly and equally all over the entire surface, in order that a regular and constant pressure may be kept up during the solidifying of the materials of which the wall or other aggregate is composed. The sides and ends of the wall are enclosed in wooden frames or coffers bound firmly together by means of screw bolts passing through the materials as well as over the top, which screw bolts take into screwed nuts, thus allowing of the possibility of compressing the materials in that manner, also as well as by means of the weights above mentioned.

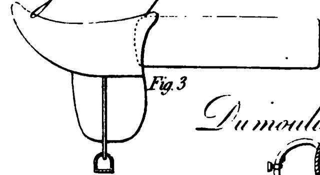
The Patentee has annexed to his specification two sheets

of drawings, for rendering his description of the construction of the moulds or boxes more intelligible. He has shown in the drawing several views of moulds or boxes for making his artificial stone; one set of figures representing different views of a mould or box for making a plain block stone, and another for making the capital of a fluted Doric column; but as the construction of the mould, as to the external arrangement, is exactly the same in both instances, we have not thought it necessary to give a detailed description of more than one mould, merely observing that the difference in the internal arrangement, consists in the one instance of a plain square or oblong box, and in the other, of the requisite shape and flutes required for the capital of a Doric column.

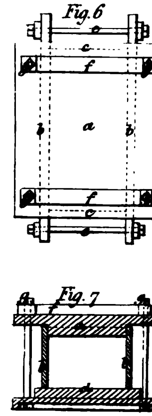
Plate III., fig. 6, represents a plan view of one of the moulds or boxes with its lid or top, for making a plain block of stone; fig. 7, is a transverse section taken through the middle of the same; *a, a,* being the lid; *b, b,* the sides; *c, c,* the ends, and *d,* the bottom of the mould. The sides *b, b,* are connected together by screwed bolts and nuts *e, e,* which keep them in close contact with the ends *c, c*; *f, f,* are beams placed across the lid, which is pressed down and kept so by means of the screws, bolts, and nuts *g, g,* in the ends of the beams *f, f.* It will now be seen that when the materials are put in the mould, and the lid or top is placed on, the said materials may be consolidated by screwing down the screw bolts *g, g,* which will compress them, and render the artificial stone very solid and hard.—[*Inrolled in the Inrolment Office, June,* 1834.]

Bower & Blyth's Impts. in Saddles

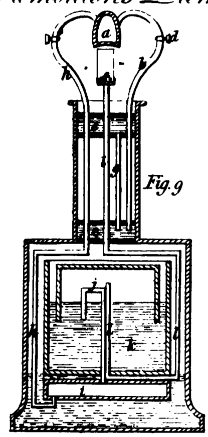




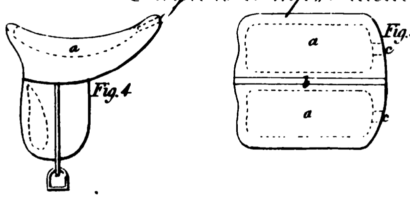
Ranger's Cement



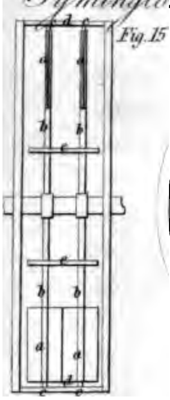
Dumoulin's Lamp

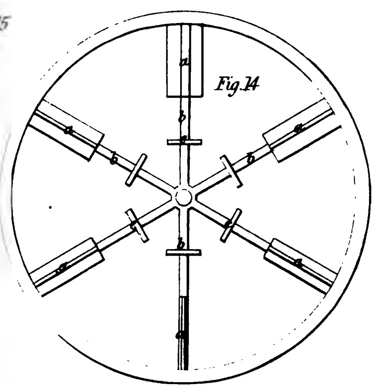


Taylor's Impd. Saddle

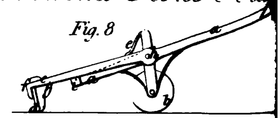


Symington's Paddle Wheel

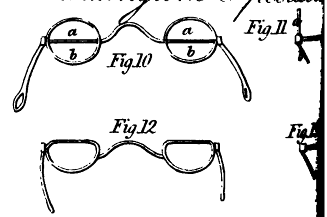


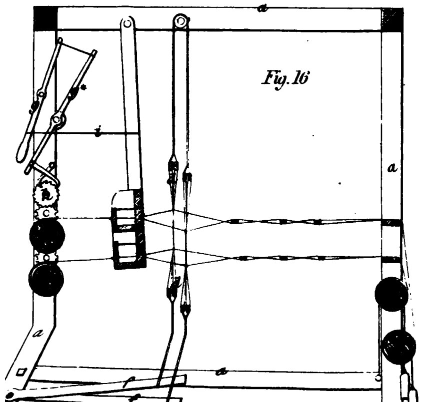


Bourne's Road Scra

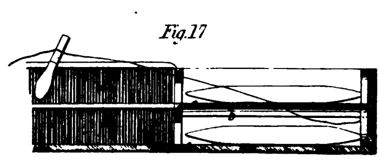


Elkington's Spectac





Hall & Slack's Impts. in Looms



To Manoah Bower, *of Birmingham, in the county of Warwick, manufacturer, and* George Blyth, *of the same place, merchant, for their invention of certain improvements on or additions to saddles for horses.*—[Sealed 22d October, 1834.]

The Patentees, in their specification, describe their invention as consisting in the application of what they denominate a curtain to saddles for riding or driving, and they have given a detailed description of the application of this curtain to both these sorts of saddles. The first part of the specification describes the curtain as applied to chaise or driving saddles, and consists of a covering made of leather, and constructed in such a manner that when it is not required for use it may be folded up and lay inside the back part of the saddle, and be thus hid from view.

The Patentees describe the advantages arising from this, as consisting in always having a covering at hand whenever the horse is at work, that may be brought into use at any time to protect his loins, and answer the purpose of a horse cloth.

This part of the invention is represented in Plate III., at figs. 1, and 2; fig. 1, is a plan view of the saddle, with the covering or curtain extended; fig. 2, is an edge view of the curtain, showing the construction of it. This curtain *a, a,* is made of a framework of jointed wire with a covering of leather over it, and having straps *b, b,* for the purpose of the guiding it when being opened, and also for shutting it when desired. These straps are attached to an iron framing *e,* at the end of the curtain, and pass through the jointed wire framing of the curtain, as seen, and over pulleys or rollers mounted in the saddle tree, and then returns underneath the curtain or covering to the splash board of the chaise, so that it may be at hand for

use; *d, d,* are the rings for the reins, as in ordinary harness; *e, e,* are straps for the purpose of drawing out the curtain when required: it will be seen that this curtain is constructed in a way somewhat similar to a lady's fan, and opens and closes in like manner.

The second part of the invention is represented at fig. 3, which is a plan view of a riding saddle with the curtain or covering attached thereto in this instance. The curtain is attached to the fore part or pommel of the saddle, and when not in use it is to be rolled up and placed in a cavity or recess formed in the fore part of the saddle, and shown by dots in the figure, and there retained by means of straps and buckles. This covering is made of any waterproof fabric; but the Patentee mentions that particular sort manufactured by Messrs. Mackintosh as the fabric that they use for this purpose. The use of this curtain is to cover the saddles and the loins of the horse, or else the thighs and stomach of the rider.—[*Inrolled in the Inrolment Office, April,* 1835.]

To JOHN OSBALDESTON, *of Blackburn, in the county of Lancaster, weaver, for his invention of an improved method of making a metal heald or healds for the weaving of silk, woollen, worsted, cotton, or any other fibrous substance.*—[Sealed 16th December, 1835.]

THE Patentee commences his specification by saying, that his invention does not apply to that description of metal heald which is made from a flat piece of metal, with an eye-hole drilled through it, for the purpose of admitting the warp thread; as in that sort of heald, the eye-hole has a sharp edge, which is very liable to cut the thread. Now, this improved metal heald is constructed of one single length

of wire, either of brass, copper, or other suitable metal, and the method of forming the heald is as follows:—

A piece of wire, of sufficient length, is to be obtained, and a loop made in the middle of it, as if it were intended to make a common knot; one end of the wire is then to be taken up and passed through the loop already formed, and returned to its former position; the other end of the wire is then to undergo the same operation, and the wires are to be twisted one over the other so as to form a compact and solid wire rope. It will then be found that a strong metallic heald is formed, which will not be liable to cut the warp threads, as the surface of the wire is round.—[*Inrolled in the Inrolment Office, June,* 1837.]

To WEBSTER FLOCKTON, *of Horselydown, in the borough of Southwark, turpentine distiller, for his invention of an improvement in the manufacture of rosin.*—[Sealed 23d August, 1834.]

THIS invention consists in conveying the rosin in a melted state direct from the still into coolers or refrigerators, instead of ladling it into moulds as in the ordinary manner, and allowing it to cool gradually, the improved method causing a great saving of time and labour. The Patentee describes two methods of carrying his invention into effect: by the first, he runs the rosin direct from the still into water; and by the other, into earthenware coolers. The first method is described in the following manner:—

A shallow water-tight trough or cistern is constructed near the still, of metal, wood, or brick, cemented, and is placed below the exit pipe, so that the rosin may be run from the one to the other with facility. This cistern is

about nine inches in depth, and the bottom of it is covered with clear cold water to about the depth of three inches; rain water, filtered, is best, but clear cold spring water will answer the purpose. The cock or plug of the exit pipe of the still is then opened, and the rosin, in a melted state, is allowed to run into a shoot, which distributes it equally over the surface of the water in a thin sheet. As the rosin in its melted state is at a high temperature, it will, upon being precipitated from the shoot into the water, float on the surface thereof for a short time, and adhere slightly to the sides of the vessel; but when it gets slightly cooled, which it will soon do by the action of the water, then it will contract from the sides of the cistern or trough, and sink to the bottom: water must then be allowed to flow through the cistern until the rosin is quite cold; the water is then run off, and the rosin, which will be found to be of a beautifully transparent, or else of a light yellow, colour, according to the quality used, is then broken into pieces, and packed in casks or mats for the market.

The other method proposed by the Patentee, is cooling the rosin suddenly, by means of earthenware jars, and is thus described:—A trough or cistern is to be placed in any convenient situation near the still; and in this trough are placed a number of jars of the form of an inverted cone, made of unglazed earthenware, and which, therefore, are porous. When the rosin is nearly ready, water is poured into the cistern, and is allowed to well saturate the earthenware jars, to prevent the rosin from sticking to them; and when they are sufficiently saturated, the water is drawn off, and a cover or lid to the cistern, having holes for the tops of the jars, is put on, and the melted rosin is allowed to flow on to this cover or lid, and thus runs into all the jars; when they are all full, cold water is again admitted into

the cistern, which flowing up round all the jars, suddenly cools or refrigerates the rosin contained therein, the water being allowed to flow through until the rosin becomes quite cold.

The Patentee says, that the advantage derivable from the employment of this invention, is the great saving of time in preparing the rosin for the market.—[*Inrolled in the Inrolment Office, February,* 1835.]

To JOHN BOURNE, *of Ilchester, in the county of Somerset, road-surveyor, for his invention of a machine for scraping or cleaning roads and other ways.*—[Sealed 22d October, 1832.]

THIS invention consists in constructing a machine or apparatus for scraping mud or dust from roads or other ways, whereby a great saving of time is effected. The machine consists of a number of scrapers mounted in a frame, which frame is supported by two wheels, and the apparatus is so contrived, that the scrapers may be raised from the ground or lowered on to it, and there retained by springs, so as to scrape and collect the mud or dirt.

In Plate III., fig. 8, is a longitudinal section taken through the middle of the machine; *a, a,* being the framework, supported by wheels *b*; *c, c,* the scrapers mounted upon the axle *k*, and having an iron plate *d*, affixed to that part of them that drags upon the ground; these scrapers are kept down upon the ground by means of springs *e*, as well as by their own gravity, which the Patentee supposes would not be sufficient to make them perform their work properly: the scrapers are also sometimes weighted at their

ends, as at *f*, for the same purpose: *j*, is a plate of metal affixed to the side of each of the end scrapers, and is placed there to prevent the mud or dirt from escaping.

Now, when the machine is to be put in action, the scrapers are to be brought to that part of the road that they are intended to act upon, and the framing *a*, is raised by the handle *g*, thus allowing the scrapers to bear upon the surface of the road; the machine is then drawn to the side of the road, and the mud or dirt is there deposited; the workman then depresses the handle *g*, which, as the framing is mounted on the centre *h*, throws the whole weight of the machine upon the wheels. This movement also raises the scrapers entirely off the ground, as they are lifted up by the rod *i*, which passes under them, and connects the two sides of the framing together; the machine is then driven back diagonally to the middle of the road, and the same operation is repeated. It should be here observed, that any number of scrapers may be used, and they may also be placed in the form of a segment of a circle, and also that they all work independently of each other, so that they may effectually cleanse that portion of the road that is allotted to them: for instance, some may have to sink into hollows, while another may have to go over a raised portion of the road.

The Patentee says, that he does not confine himself to making the machine of any given material, as it is evident that it may be made of wood, iron, or any other suitable substance; nor does he confine himself to placing the scrapers in a straight line, as they may with equal efficacy be placed in a curve, as before mentioned; but what he claims as his invention, is the constructing of a machine for scraping or cleaning roads or other ways, in which the scrapers are placed at right angles to the line of draught;

and each of the scrapers is made to act independently of the others, as above described.—[*Inrolled in the Inrolment Office, April,* 1833.]

To ALEXIS DUMOULIN, *of Leicester-square, in the county of Middlesex, gentleman, for his invention of certain improvements in gas apparatus.*—[Sealed 19th May, 1835.]

THIS invention, although described by the Patentee in the title of his patent as gas apparatus, is, more properly speaking, a table lamp; and is described by him in the commencement of his specification as a portable gas apparatus, arranged and combined in such a manner, that the flame which emits the light produces at the same time a further supply of gas for combustion.

The apparatus described by the Patentee is shown in Plate III., at fig. 9, which represents a vertical section taken through the middle, and all the parts are combined and arranged so that they may be contained within the space usually occupied by the several parts of a table lamp: *a,* is a small vessel or retort for the production of the gas. This retort is supplied with the oil, destined to be converted into gas, by a pipe *b,* the lower end of which pipe is inserted into a chamber *e,* containing the oil; the pipe *b,* is also furnished with a stop cock *d,* for the purpose of limiting or cutting off entirely the supply of oil to the retort *a*: a small chamber *e,* under the burner *f,* is furnished with a quantity of sulphate of zinc and water, for the purpose of forcing up the oil from the chamber *c,* into the retort; the two chambers *c,* and *e,* being in communication with each other by means of the pipe *g*: another pipe *h,* on the reverse side of the retort to that occupied by the oil pipe *b,* conveys the gas as it is generated by the heat of the burner down into

the condenser *i*, at the bottom of the apparatus, the condenser being surrounded by water, as seen in the drawing. The bent tube or syphon pipe *j*, is for the purpose of conducting the gas into the gasometer *k*, from whence it is conveyed by the pipe *l*, to the burner *f*.

The Patentee here states, that having described the manner of "combining" the various parts, he would remark, that he has not considered it necessary to show the manner of introducing the oil, water, and other materials into their several chambers, as that would be readily understood by any competent mechanic.

The manner of putting the apparatus into action is described in the following manner:—The stop cock *d*, being open, the oil is forced up the pipe *b*, into the retort, through the medium of the pressure generated in the chamber *e*, by the chemical action of the water upon the zinc; heat must now be applied to the retort or vessel *a*, by a small hand lamp, or in any other convenient manner, for a few minutes, when it will be found that gas will be rapidly generated, and passing down the pipe *h*, will enter the condenser, from whence it is conveyed to the gasometer by the syphon pipe *j*; it is then conducted from the gasometer to the burner by the supply pipe *l*, when, upon applying a lighted taper to the burner, the gas will ignite, and a continued production of gas will be kept up until all the oil is used.

In conclusion, the Patentee says, "that it will be evident that the various parts of the above-described apparatus may be combined in other ways; and, also, that one light may be made to generate a quantity of gas sufficient for more burners than one. I do not, therefore, confine my claim of invention to the exact arrangement hereinbefore set forth and described; nor do I confine myself to the particular materials of which the said improved apparatus shall be constructed; but I claim as my invention, a portable gas

apparatus, so arranged and combined, that the flame which gives off light is at the same time producing a supply of gas for further combustion."* — [*Inrolled in the Inrolment Office, November,* 1835.]

To Richard Elkington, *of Birmingham, in the county of Warwick, optician, for his invention of, and improvement or improvements in the constructing, making, or manufacturing of spectacles.*—[Sealed 10th October, 1834.]

This invention consists in constructing spectacles in such a manner, that the lens or lenses may be placed at right angles to the direct line of vision. The Patentee in his specification has shown two different sorts of spectacles, one pair being intended for near-sighted persons, and the other pair for long-sighted persons.

Plate III., fig. 10, represents in plan a view of a pair of spectacles intended for the use of near-sighted persons, and having two pair of lenses; fig. 11, represents a side view of the same; *a, a,* being the upper pair of lenses, and *b, b,* the lower pair. It will be seen by reference to the side view, fig. 11, that the lower pair of lenses *b, b,* are placed at an angle of about forty-five degrees from the perpendicular of the upper pair *a, a.* The upper pair *a, a,* are made of such a focus as would be required by near-sighted persons when walking, and the lower pair have a focus that would be required when reading. It will now be seen that when the person using the spectacles looks

* There have been other patents for the same object as the above, namely, the volatilization of oil, and burning it in the state of gas; among others, Bradford's, for improvements in lamps. See vol. ix. of our present Series, p. 221.—Ed.

straight forward at a distant object, the line of sight is cut at right angles by the lenses *a*, *a*, and also when he looks down at any object, such as a book, in the act of reading, the line of sight, in this instance, is also cut at right angles by the lenses.

The Patentee here observes, that as it is evident the lenses are always at right angles to the line of sight, the object at which the person is looking can never be distorted by refraction. Another advantage derivable from the use of these spectacles, is their acting as preservers, as they effectually preserve the eye from the effects of wind or dust. It must also be observed that the focus of the lens should always be in the middle, and that, therefore, the two lenses should be cut and ground separately, in preference to using one lens cut into two parts. Fig. 12, represents a plan or horizontal view of a pair of spectacles intended for the use of long-sighted persons; and fig. 13, is a side view of the same: in this pair of spectacles there is only one pair of lenses used, and they are intended for close objects, such as reading. It will also be seen that the upper part of the eye frame in these figures is flattened, to allow the wearer to look over the glasses when in the act of walking or looking at any distant object, but that the lens is also in this instance placed at right angles to the line of sight.

The Patentee says in conclusion, that he wishes it to be understood that he does not mean or intend to claim as his invention any parts of spectacles that have been before known or in use; but what he does claim as his invention, is the placing the lenses of spectacles in an oblique direction, so that they may cut the line of sight at right angles, as before described.—[*Inrolled in the Inrolment Office, April,* 1825.]

To William Symington, *of Bromley, in the county of Middlesex, cooper, and* Andrew Symington, *of Faulkland, in Fifeshire, in that part of the United Kingdom called Scotland, watch-maker, for their invention of a paddle-wheel of a new and useful construction, for the propulsion of vessels and other motive purposes.*—[Sealed 23d June, 1834.]

This invention is for constructing a paddle-wheel in such a manner that the paddles shall enter the water edgeways, and offer the greatest possible resistance to the water, and when leaving the water shall come out edgeways, thus making little or no tail water.

The paddle-wheel described by the Patentees, consists of pairs of paddles that revolve on centres, and enter the water edgeways, and while immersed, present the whole of their face to the water, thus offering a very considerable propelling surface.

Plate III., fig. 14, represents a side elevation of the paddle-wheel, as constructed by the Patentees, and fig. 15, is a front elevation of the same; *a, a,* are the pairs of paddles mounted on centres *b, b, c, c,* the centres being mounted in iron bearings *d, d,* extending across from the side framings of the wheel. The paddles are made to revolve on their centres by means of toothed segments *e, e,* that are set in motion by the revolution of the paddle-wheel itself. It is here stated that these improvements may also be applied to the uses of water-wheels, but the Patentees have not informed us in what manner they may be so applied.

The Patentees do not claim these toothed segments as a power for causing the paddles to revolve on their centres, as they may be dispensed with, and other means may be used, nor do they claim any precise angle at which the

paddles may enter the water, but they claim as their invention the arrangement of the several parts, so that the paddles may offer the greatest possible resistance at that point where the greatest leverage power is required; and they also claim a right to vary the several parts to suit different circumstances, at the same time avoiding any departure from the principles of the invention.—[*Inrolled in the Inrolment Office, December,* 1834.]

To ANDREW HALL, *of Manchester, in the county of Lancaster, manufacturer, and* JOHN SLACK, *the younger, of Chorlton-upon-Medlock, in the said county, putter out, for their invention of improvements in the construction of looms for weaving.*—[Sealed 12th August, 1834.]

THE improvements specified by the Patentees, consist, firstly, in an improved construction of loom, whereby two or more pieces of cloth or other fabric may be woven at one and the same time; the beating-up action for the two separate pieces being performed by the same lay or slay; and, secondly, in an improved picker, which will be found to possess greater durability than those now generally used. This improved loom is a horizontal one, the one piece being worked over the other; but in order that the invention may be fully understood, we have represented in Plate III., at fig. 16, a vertical section taken through the middle of the loom, at the time when the lay or slay is at rest, that is just after it has beaten up the weft, and previous to its being pushed back, so that the shed may be opened to admit the shuttle; the framework of the machine is shown at *a*, *a*; the warp beams, with their weights to create friction, at *b*, *b*; and the work beams, with their taking-up motion, at *c*, *c*: *d*, *d*, are the double healds or headles, which are con-

structed in such a manner that they open the sheds of both the warps at the same time. The healds or headles are constructed in such a manner, that although one set of headles opens the sheds of the two warps, yet they do not at all interfere with each, and there is always a clear way for the shuttles to run. They are made with two hoops instead of one, as will be seen in the figure. The lay or slay consists of a double reed, with double shuttle races and shuttle boxes, and is shown at *e*; and part of the lay or slay is shown at fig. 17, which represents a partial front view of the slay; and fig. 18, a transverse vertical section, taken through the shuttle box, showing the construction of the same with the double race; *f*, *f*, are the treadles for working the healds or headles; *g*, *g**, are taking-up levers, acted upon by the vibration of the slay; *h*, is a ratchet-wheel having a pall or click taking into it, which pall is connected to the end of the lever *g**. It will now be seen that as the slay vibrates, it pulls with it one of the levers which is attached to the slay beam at one end by a rod *i*, for that purpose, the other end of this lever being connected to the lever *g**; by another rod, and at the reverse end of this lever *g**, is a click taking into the ratchet wheel *h*, as above described; and on the axle of this ratchet wheel *h*, is a small pinion gearing into another pinion, and by a series of wheels and pinions giving a slow but regular progressive motion to the work beams *c*, *c*.

The second feature of the invention, is an improved construction of pecker or picker; the description of this head of the invention will be better understood by referring to figs. 17, and 18, before mentioned. This improved picker is constructed of iron, having a small round hole *a*, made into it; and into this hole is fitted a small piece of prepared buffalo skin, such as is usually employed in the manufacturing of

peckers, so that when this piece of buffalo skin is worn out, it will only be necessary to insert a new piece, thus rendering the pecker equal to new, and, at the same time, economising the use of the buffalo skin. It will be seen in the drawing, that the pecker is mounted on a small shaft b, and that the same pecker throws the two shuttles; c, c, are the top and bottom race boards, and *d*, *d*, the double reeds. The Patentees also propose substituting India-rubber, or caoutchouc in place of the buffalo skin, usually employed in the construction of peckers in those instances when the elasticity of the material will not give rise to inconvenience, which it will not do, if there is any arrangement of springs in the shuttle-box, to prevent the shuttle from rebounding; and the Patentees inform us, that they consider this to be an important improvement in the economy of weaving.

In conclusion, the Patentees state that they do not claim as their invention any of the parts of the loom that have been before known or in use; but what they claim as their invention, secured to them by the present Letters Patent, is, firstly, the improved construction of loom as above described, whereby they are enabled to weave two pieces of cloth or other fabric at one and the same time, and having but one lay or slay to beat up the weft or shoot of the two pieces; and, secondly, the improved construction of peckers whereby economy, in the use of the buffalo skin, is practised, as above described.—[*Inrolled in the Inrolment Office, December*, 1834.]

To FRANCIS MOLL, *of Grove-lane-terrace, Camberwell, in the county of Surrey, Esq., for his invention of improvements in preserving certain vegetable substances from decay.*—[Sealed 19th January, 1836.]

THIS invention is for impregnating timber with two products of coal-tar, which the Patentee denominates enpion and kreosot. These products are obtained in the following manner:—A quantity of coal-tar is put into a still, and a gentle heat is applied, until a vapour comes over; which vapour is to be condensed in the ordinary manner. The distilling operation should be continued until the enpion has acquired about the same specific gravity as water.

This product, when in its pure state, the Patentee informs us, is called by English, as well as German, chemists "enpion;" and although it is not exactly in a pure state when obtained, as above described, it is of sufficient purity for the purposes to which it is to be applied by the Patentee. The "enpion" obtained as above described, will be found, upon testing it with the proper tests, such as litmus paper, &c. to contain acids; these acids, however, may be got rid of by washing the enpion with lime or other alkaline water, or a quantity of dry lime may be mixed with the coal-tar to neutralise the acid; and if water is distilled over with the enpion, the enpion will be found floating on the surface of the water, and may be drawn off.

The next product is obtained by raising the coal-tar in the still to a very high temperature, when a further vapour will come over freely, leaving only the pitch in the vessel; this is also to be condensed in the same manner as the enpion, and is called by English, as well as German, chemists "kreosot." This product may also be subjected to the action of lime-water, to free it from any acids, if thought

desirable. When these products are obtained, the Patentee applies them to the timber in the following manner:—

A cast-iron tank or chamber is to be constructed in any convenient manner, and the timber placed therein in such a manner that the vapour of the enpion and kreosot may have free access to all parts of it. The temperature of this chamber should be raised to about 90 or 100 degrees of Fahrenheit's thermometer, by steam pipes or any other convenient means.

Previous to allowing the vapour to enter, it is requisite that this operation should be performed so that the enpion may be allowed to flow into the chamber in a state of vapour and fill it; and it is also required to expel any degree of moisture from the timber.

After the chamber has been heated a sufficient time, the water that has been expelled from the timber by the heat, should be drawn off, and the vapour of enpion should then be allowed to enter and diffuse itself throughout the chamber, when it will impregnate the timber. When the timber has been sufficiently impregnated with enpion, the enpion should be drawn off and the vapour of kreosot must then be allowed to enter from the still; and the kreosot will be found to have such an affinity for the enpion, that it will speedily impregnate the whole of the timber wherever the enpion has gone, the enpion acting as guide, and the kreosot itself being the antiseptic. The chamber should then be filled with hot kreosot in its liquid state, and be allowed to remain some time.

The Patentee here states, that it is impossible to lay down any rule as to the time required for each operation, as the nature of wood differs so materially even among the same species; but that experience will easily teach the workman; and it would be as well to observe that a small test chamber,

would greatly facilitate the operations of the workman, as he can try experiments upon small pieces of the timber, and calculate from the results obtained, how long it will require to keep the log in the chamber. The timber should be arranged vertically in the chamber if it can be conveniently managed, but if not, it should be placed on an iron grating at the bottom of the chamber, and so arranged that every part of the timber may be acted upon by the enpion and kreosot.

The Patentee here remarks, that the products of enpion and kreosot may be obtained from other substances than coal-tar; but that he prefers obtaining these products from the last-mentioned material, owing to its cheapness; and also, that he is well aware that coal-tar and such like substances have been heretofore used for the purpose of preserving timber; he, therefore, does not claim, as his invention, the use of tar for this purpose, but only the use of the two before-named products, viz. enpion and kreosot, which impregnate the wood and penetrate as far as the heart, and effectually preserve it from the effects of dry rot. —[*Inrolled in the Inrolment Office, July,* 1836.]

To David Mushet, *of Coleford, in the parish of Newland, in the county of Gloucester, iron-master, for his invention of a certain improvement in the art of making or manufacturing bar-iron or malleable iron.*—[Sealed 22d October, 1835.]

This invention of improvements in the art of making or manufacturing bar-iron or malleable iron, relates to that part of the process which is generally known under the denomination of "puddling," which is the process now in general use, for converting cast or crude iron into malleable

iron; and this process is carried on in a particular kind of furnace, commonly known by the name of a "puddling furnace."

The Patentee here remarks, that he wishes it to be understood that what he technically calls cast-iron, is the term used for all the different qualities of crude iron that are obtained from the smelting of iron ores, by the operation of the blast furnace, which process produces metal capable of being re-melted, and is commonly denominated "cast-iron," as above mentioned, because it may be cast into any form by pouring it, when in a molten state, into moulds; and it is also called by the name of pig-iron or sow metal, because of the rude or rough shape of the bars into which it is cast when it is run out of the blast furnace. It is generally admitted that cast-iron contains a considerable quantity of carbon; and it is also supposed that the iron derives its fusibility from the great quantity of carbon that it contains, and, therefore, the greater the quantity of carbon contained in the iron, the greater degree of fusibility exists.

The Patentee states, that the various qualities of the iron are commonly known among the trade by the numbers 1, 2, 3, and 4, the highest number being of the best quality, and considered to contain the greatest quantity of carbon, and, therefore, being the most fusible; the inferior numbers are used by founders for making castings, and are for that reason called founding metal. This metal is called grey iron, from the appearance which it presents when recently broken.

The cast-iron, or pig-iron, which is made for the express purpose of being afterwards converted into wrought-iron or malleable iron, is commonly denominated forge pig-iron or bright grey iron, and is generally considered as inferior in quality to all the other numbers that are used by the iron founders, as it contains a much smaller quantity of carbon,

and is, therefore, less fusible, and, consequently, will not answer their purpose so well as the others. There are also two other sorts of iron sometimes made by the blast furnace, to be converted into malleable iron, and contain less carbon than those above referred to; the first of which is called mottled cast-iron, from the colour it presents when broken; and the other is of a still inferior quality, and contains a very small quantity of carbon, and is, consequently, extremely difficult of fusion, this is called white cast-iron; and before it is worked, it is required to be amalgamated with cast-iron of a richer quality.

Before this cast-iron, called forge, pit, or bright grey iron, or mottled iron, is submitted to the before-mentioned puddling process, for the purpose of being converted into malleable iron, it is generally prepared for that operation by a previous process of melting in a furnace, known by the name of a running-out-fire or furnace, sometimes called a "finery;" in this process coke is used for fuel, and the flame is blown by a blast down upon the molten metal. After this process of melting and running out, or refining, the prepared cast-iron is called refined metal, and known in Staffordshire by the name of "plate." It is generally supposed that the iron is, by this process of running out or refining, deprived of some portion of its carbon which it contained when it was first run out from the blast furnace; and it is also supposed that the carbon is consumed, dissipated, or burnt away in the process of running out, as the refined metal or plate becomes less fusible than it was before, which, the Patentee states, is a desirable preparation for undergoing the puddling process.

All the different qualities of iron ore, which are obtained from the blast furnace, such as the grey, mottled, and white, are all mixed together when put into the running-out furnace, in order to obtain a medium quality of refined

metal. The operation of the running-out-fire is conducted in such a manner, as to act with more or less intensity upon the crude iron, according as previous experience will point as most suitable, by way of preparing each quality or mixture of various qualities for conversion into malleable iron into the puddling process. The iron, under these circumstances, is supposed to be deprived of its carbon until only such a quantity remains in combination with the metal as will render it most convertible.

Cast-iron or crude metal so prepared is technically said to be either under-blown or fully-blown, according to its deprivation of carbon, that is, if the running-out process has not had much effect upon the carbon, it is said to be under-blown; if, on the contrary, it is deprived of a considerable quantity of carbon, it is fully-blown.

The puddling process is carried on in the following manner:— A suitable quantity of the refined metal or plate is heated therein by a strong pit-coal fire, and the flame being urged by a draft, caused by a high chimney, acts upon the metal, which becomes partially melted, and is brought away in a semi-fluid state; it is then kept continually stirred up, and turned over, so that the flame may act equally upon all parts of the semi-fluid mass, which soon commences to bubble or effervesce from the effect of fermentation: during this action the metal appears to glow with an increased heat, and emits a blue flame; the stirring being vigorously continued during the process of "fermentation," so that the whole mass may be alike subjected to the heat; and by a continuation of this operation, the semi-fluid metal will be found to thicken by degrees, and lose its fusibility, and be converted into malleable iron, or, as the workmen call it, "brought into nature." This conversion is supposed to be effected by the dissipation of the carbon. As this latter process proceeds, the iron, when

losing its fusibility, is said to become dry, and when it loses its fluidity it gets into a crumbling state; it is then collected into lumps, and an intense heat being urged upon it for a short time, it is brought to a white heat; the lumps or masses are then withdrawn one by one from the furnace, and welded or made solid by blows from a heaving forge hammer; and the rudge lump so treated before it loses its heat is repeatedly passed between rollers, in order to reduce or flatten it into the shape of a bar. The hammer is sometimes dispensed with, and the masses of hot iron when brought from the furnace, are passed between the rollers to effect the welding, as well as forming the lumps into bars.

The rough bars are then divided into short pieces, which are piled into suitable masses and heated to a welding heat, and are then welded together into a solid mass by being passed between rollers, and by continuing the rolling operation, the metal is formed into a finished bar of malleable iron. It is also the practice to "revive" and smelt the slag cinder and scoria, which is the result of a partial oxydation with some fresh ore, and by that means saving a great part of the metal that would otherwise be wasted. This slag cinder or scoria undergoes all the processes of the good ore, and is formed by the forge hammers and the rolling process, before described, into finished bars of iron; but the iron thus obtained is not found to be of so good a quality as the other sorts; it is, therefore, found requisite in the treatment of the same, to carry out the running-out or refining process, before described, to its full extent, so that the metal may be fully blown, as a preparation to its subsequent conversion in the puddling furnace into malleable iron.

The use of scoria or slag cinder in the blast furnace, in admixture with native ore is, that it is used instead of a portion of the good ore that would otherwise be wasted and

it produces a fusible quality of cast or crude iron, but being not otherwise inferior in quality; but it is not desirable to have too great a degree of fusibility in the metal in the puddling process, because, when it is brought into a pasty fluid state, when the action of fermentation, above described, takes place, and the metal is converted into malleable iron, it will take a longer time in manufacturing, as if it is too fusible it will be entirely melted in the puddling furnace, and must, therefore, remain exposed to the action of the flame for a longer time, in order to acquire some consistency, which is favourable to the process of fermentation. The treatment of the metal in the running-out process is, therefore, carried to the full extent, and the metal is full blown, or is carried out to any intermediate extent which experience would dictate, and the quality of the iron or the qualities of any mixture would require.

The Patentee here says, that all the above particulars are fully known, and constitute no part of his invention; that he has only introduced them, that his improved process of manufacturing malleable iron or pig-iron may be better understood; and also, by way of explaining the different terms that may be used in the after description of the invention. He then proceeds to describe in what his invention of improvement in this branch of the manufacture consists. The improvement specified consists in adding to the iron that is undergoing the puddling process in the furnace, a quantity of rich iron ore in the state of powder, so that as suitable quantities from time to time are thrown in upon the semi-fluid iron it becomes mixed and intermingled with the said semi-fluid metal, by means of the continual turning over and stirring to which the metal is subjected, as above described: during the puddling process, the Patentee also uses charcoal or coal mixed with the said ore, care being taken that these materials are reduced to

powdered and intimately mixed with each other; small quantities of this mixed powder must then be thrown into the furnace from time to time previous to the fermentation, and during its progress, the said fermentation being increased, and the thickening or conversion of the iron being facilitated by this improvement in the manufacture of bar-iron or malleable iron.

The advantages derivable from this improvement is, that in some cases greater quantities of bar-iron can be made from a given weight of crude or cast-iron than could be obtained by the ordinary process, and the quality of iron shall be as good in the one as the other; and this advantage is, that in some cases a superior quality of bar or malleable iron can be produced from an inferior quality of cast or crude iron, which could not be done without the aid of this improvement; and, in other cases, the beneficial result will be, that by aid of this improvement, bar-iron of a better quality may be made from a smaller quantity of crude or cast-iron, than in the ordinary course of proceeding in making bar or malleable iron.

The operation of this improvement is, that the rich iron ore that is thrown in a powder upon the semi-fluid metal in the puddling furnace, facilitates and expedites the separation of carbon from the said semi-fluid metal, as the rich ore is very suddenly heated by its application in small quantities, and in a divided state. The quantity of rich ore that is thrown in upon the semi-fluid metal being small, its tendency to decrease the heat of the said metal may be easily overcome by keeping up a strong fire, and by the operation of turning over or stirring, above described; the powdered ore being intimately mixed by the aforesaid operation as quickly as possible, and the ore being suddenly heated, it will facilitate the separation of the carbon from the semi-fluid iron, as it evidently assists and promotes the internal

effervescence or fermentation, which is supposed to be occasioned by the separation of the carbon from the crude iron during its conversion into malleable iron.

The iron contained in the ore which is added to the semi-fluid metal not only increases the quantity of bar or malleable iron, but also greatly improves the quality of the same, and gives the bars a more fibrous texture than they would otherwise have. The iron ore which is employed for this improvement may be of any kind which is very rich in the metal. There are many kinds of ores obtained from foreign countries which would answer the purpose; but the Patentee prefers those obtained in England, from Cumberland, Gloucestershire, Lancashire, or many other parts, as they will answer equally as well. The rich ore which is used is reduced to a fine powder, small enough to pass through a wire sieve or riddle containing about three hundred meshes to the square inch, but the finer the powder, the better it will operate. The ore may be broken and pounded fine by stampers, of the kind usually employed in Cornwall for reducing tin ores to powder, or it may be ground by rolling stones called runners, or by any other suitable means.

The ore may be previously prepared by roasting or calcining, but that is not essential; however, if a moderate degree of roasting or calcining will facilitate the reduction of the ore to powder, it is as well to use it; and in case charcoal or coal is used, this must also be reduced to a fine powder, by any of the before-mentioned apparatus, that which is used for grinder moulder's blacking being very suitable for this purpose; and either vegetable or animal charcoal may be used.

The proportions to be observed in using the iron ore in powder in the puddling process, are as follows:—To make common bar-iron, the puddling furnace is charged with

about four hundred and fifty pounds weight of crude or cast-iron, varying in quality, as has been before observed, from what is called bright grey or mottled, approaching to white, mixing them together as experience will dictate, for producing an average quality; the selection of the qualities and the proportions to be observed being left entirely to the discretion of the workman, as it is commonly exercised by the iron-master in the ordinary manufacture.

It may be here observed, that by the aid of this improvement, the previous preparation of running-out or refining may be dispensed with, and the crude iron charged at once into the puddling furnace. The management of the puddling furnace is the same as is usually practised, which is somewhat in the following manner:—Before the furnace is charged, it must be brought to a proper heat, and the bottom prepared in the usual manner for the charge, by laying a quantity of slag cinder or scoria, which has been separated from puddle balls and re-heated piles of puddle bars; but after the charge has been put in, with the bottom so prepared, no more slag cinder or scoria is to be thrown in during the operation of melting or converting the iron; when, by the usual course, the charge or cast-iron begins to be melted, so as to be capable of being stirred up and turned over; then the application of the improvements is to begin, by throwing in upon the partially melted iron about two pounds weight at each time of powder of iron ore, or the iron ore mixed with coal or charcoal, the semi-fluid metal being well stirred every time that a quantity of the said powder or mixture of powders is thrown in, so that the powder and metal in the furnace may become intimately mixed with every part of the charge.

The fire should be retained at its usual heat, so that the iron should be kept up at the heat usually employed in this process, notwithstanding the throwing on of the powder;

[illegible] dose of the powder seems to be fully [illegible] the metal in the furnace, and the same [illegible] arrived at its full heat again, then another [illegible] two pounds of the powder should be thrown [illegible] that has been intimately mixed, and the fire [illegible] again to its full heat, another dose should be [illegible] in, and so on, always keeping up the heat of the [illegible] would be done in the process of puddling. This [illegible] is kept up until about as much powder is added [illegible] will amount to about the eleventh part of the weight of the crude or cast-iron; first put in about forty pounds weight of coal to the aforesaid charge of four hundred and fifty pounds; or if charcoal or coal is used, then the weight of the charcoal will be about one-sixteenth of the weight of the ore with which it is mixed, and will increase the weight of the said ore from forty pounds to forty-two pounds and a half to a charge of four hundred and fifty pounds of crude iron.

The manner of adding the powder will be the same, whether it consists of a mixture of charcoal and of the ore alone, or rich iron ore; sometimes it may be found expedient to wet the powder with water before throwing it in; such damping may be given whether the powder consists of a mixture of charcoal and ore or not, according to the discretion of the workman, in the same manner as water is usually thrown into the puddling furnace in the ordinary process of working. The usual fermentation will be considerably increased by the addition of the powder in the manner before mentioned, and, of course, the conversion of the crude metal into malleable iron will be facilitated: the process is then continued and finished in the usual manner of puddling and making the iron into bars, as in the ordinary process.

The Patentee here states, that he finds twenty hundred

weight of puddle bars can be made by aid of this improvement, from twenty-one hundred weight and a half of crude or cast iron, or from twenty hundred weight and three-quarters, when the powder of rich iron ore and charcoal is used, as above described; the quality of the puddle bars being the same as would be obtained by the ordinary process of running-out or refining, and this improvement allowing the iron-master to dispense with this process, a great saving of the waste or slag cinder is made; and although one-eleventh part, by weight, of rich iron ore, in powder, is mentioned as the quantity to be added by this improvement, yet the same may be varied to one-eighteenth, according to the discretion of the iron-master, and according to the degree of fusibility desired.

Now, although by the aid of this improvement, the use of the running-out-fire or refinery may be dispensed with, and the process of puddling crude iron, as it comes from the blast furnace, may be made available by the aid of this improvement; yet this invention may be advantageously applied to puddling, and converting refined metal or "plate" into bar or malleable iron. In such cases, refined metal or plate, such as is usually termed under-blown, and which shall have lost in weight from eight to ten per cent., must be taken, and about one-twentieth part of its weight of the powdered ore and charcoal must be added to it in small successive quantities, as above described; and it will be found, upon trial, that from twenty hundred weight and three-quarters of the refined metal or plate that was put into the furnace, about twenty hundred weight of puddle bars may be obtained, and the quality of the iron will be found equally fibrous, as if made in the common way. In applying this improvement to puddling refined metal that has been fully-blown, about one-thirtieth of its weight of powder of iron ore is added; and if it is found that the

charge will not melt so easily as is desirable, then a small quantity of grey melting iron must be added, which will fine the metal to the degree of fusibility desired.

The Patentee says, in conclusion, "having now described my invention, and the manner in which the same is to be performed, I hereby declare the improvement, whereof the exclusive use is granted to me by the herein part recited Letters Patent, consists in adding rich native ore of iron in powder, either with or without intermixture of the powder of charcoal or coal, to iron which is undergoing the process of puddling in the puddling furnace, in order to be, by that process, converted into the malleable state, and manufactured into bar-iron, as above described."—[*Inrolled in the Inrolment Office, April*, 1836.]

SCIENTIFIC NOTICES.

THE GREAT WESTERN STEAM-SHIP.

On Saturday, the 24th of March, the first experimental excursion of this magnificent vessel was made on the river with the most complete success. At eleven o'clock she got under weigh, and started from Blackwall. She was accompanied by the Comet, a favourite Gravesend steamer, which was on her way down at the same time. The Comet, which appeared a mere pigmy as compared with the Great Western, had always been considered a fast-going vessel; but, notwithstanding all the disadvantages attendant upon the first trial of new machinery and engines, the Great Western beat the Comet, although the latter vessel was obliged to cheat (to use a river phrase) by getting in shore, which the Great Western was unable to do, owing to her large draught of water, and also by shaving the points. The Comet not only did not gain upon the Great Western, but as she ran down from Blackwall to Gravesend, the latter had increased her distance

about half a mile. The engines made nineteen strokes per minute, which is equal to more than seventeen miles per hour. The steam-ship went sometimes twelve knots, and generally eleven and a half knots, per hour, which is equal to fourteen statute miles. She proceeded three miles below Gravesend, and returned to her moorings at Blackwall shortly before four o'clock. The Great Western will remain in the river for another week, to complete her fittings up, and take in part of her coals, and she will then proceed to her native place, Bristol. She leaves Bristol for New York on the 7th of April. The Great Western met with one accident. In going down the river, a large sailing barge crossed her bows, and to prevent the barge being run down, the engines were stopped and reversed, when she ran foul of a ship lying at anchor on her larboard side, and carried away the starboard quarter of the vessel, besides doing other damage. The steam-vessel sustained no injury.

THE THAMES TUNNEL.

The engineers of this great undertaking have again succeeded in recovering possession of the works at the Tunnel. The usual means were taken to stop up the aperture in the bed of the river which led to the late irruption. The shore engine was set to work on Friday, and on Saturday afternoon the water had been pumped out of the shaft to the extent of six feet below the crown of the arches of the Tunnel. It is confidently expected that the works will be resumed again in a few days.

MACHINERY *v.* STEAM.

A practical experiment was made on Saturday, March 24, on the Southampton Railway, of a newly-invented machine, intended as a substitute for a locomotive steam-engine on railways, particularly on short or branch roads, where the expense of a locomotive steamer would be too costly for the traffic. The action is produced by a horse walking at an ordinary pace on a jointed platform, attached to the vehicle by a series of concealed machinery, which is so contrived that his weight and muscular strength are brought to act together, and communicate a multi-

plying force to the larger or outside wheels of the machine, which powers are capable of being increased or diminished at the will of the conductor, so as to regulate the required speed. The trial was perfectly successful, notwithstanding the disadvantages of an untrained horse and new machinery. On the first application the horse moved at a pace of four miles an hour, and subsequently conveyed the machine, which, with thirteen persons riding in it, weighed altogether four tons, at the rate of sixteen miles an hour.

STEAM v. HORSES.

It would require 12 stage coaches, carrying 15 passengers each, and 1200 horses, to take 130 passengers 240 miles in 24 hours, at the rate of 10 miles an hour. One locomotive steam-engine will take that number, and go two trips in the same time: consequently will do the work of 2400 horses. Again, it requires 30 mail-coaches (six passengers each), and 3000 horses, to take 100 passengers and mail 240 miles in 24 hours, at the rate of 10 miles an hour; one locomotive steam-engine will take that number, and go two trips in the same time: consequently will do the work of 6000 horses.

REPORT OF TRANSACTIONS OF THE INSTITUTION OF CIVIL ENGINEERS.

(Continued from vol. xi. p. 386.)

April 11, 1837.

The PRESIDENT in the Chair.

Mr. Brunel gave an account of the Thames Tunnel.—Having described the nature and difficulties of the undertaking, and the previous attempts which had been made by others to effect a similar work, he explained, by reference to sections, the nature of the strata below the river. He had adopted the rectangular form of the present excavation, because the work would set better than if of any other form, and had a better sustaining surface. The necessity of supporting the ground, and of having a sufficient

shelter, had led to the adoption of the shield respecting which so much had been said. The construction of this would be understood by conceiving twelve books set side by side on their ends. These would represent the parallel frames which, standing side by side, but not in immediate contact, fill up the excavation. Each frame is divided into three boxes or cells, one above the other; the adjustment of the floors of which, and other details, were minutely described by Mr. Brunel.

Each frame is furnished with two large slings, by which it may derive support from, or assist in supporting its neighbours; it has also two legs, and is advanced as it were by short steps, having for this purpose an articulation which may be compared to that of the human body. The frame rests on one leg, and then one side is hitched a little forward; then resting on the other leg, the other side is hitched a little, and so on. Hence the shield may be called an ambulating coffer-dam, going horizontally.

The brick-work is built in complete rings, and the advantages of this system of building had been fully proved by the fact of two dreadful irruptions having produced no disruption. Such was the violence of the irruption, that the brick-work had in one part been suddenly reduced in thickness by one-half, and in one place there was a hole as if pierced by a cannon ball. At a few feet beneath them is a bed of quicksand fifty feet deep, and above them strata of most doubtful consistency, some of which goes to pieces immediately on being disturbed. Still, however, their progress is certain, and they only require patience to allow of the ground above them acquiring sufficient density. He found gravel with a mixture of chalk or clay extremely impervious to water; in some cases he contrived to let out the water from the sand above them, and thus obtained ground of sufficient density. In their progress they were considerably annoyed by land springs, which produced cutaneous irruptions, and destroyed the finger nails of the workmen.

April 18, 1837.

The President in the Chair.

Mr. Brunel gave further explanations respecting the Tunnel.

He explained the way in which the ground above them had suddenly sunk down, owing to the run of a lower stratum of sand. This running sand, which was a very great annoyance, consisted of *five* parts water and *one* sand. Bags of clay and gravel are not best where there are many stones; for the interstices do not become properly filled up; but, in these cases, the coarsest river-sand is best; the water runs through at first, but soon stops; gravel and clay mixed are nearly impervious to water, but not so impervious as gravel and pounded chalk.

Mr. Gibb stated that he had found bags filled with clay and tow-waste exceedingly impervious to water. Being called upon to rebuild a sluice in a place where piling, owing to the stony nature of the ground, was impossible, he had formed a coffer-dam by laying down bags full of clay and tow-waste, in tiers of four, formed on the top of each other to the surface of the water.

The ventilation of the Tunnel is effected by a pipe of fifteen inches square passing out under the fire-place of the steam-engine boiler.

"Description of a proposed Levelling Machine. By John Harrison."

Mr. Harrison proposes to construct a machine which should make its own section of the country as it passes over it. This machine, of which the general appearance is like a caravan, is to be drawn on four wheels by horses, the machinery being moved by the wheels of the carriage. A section is generally made by marking on the base line the lengths; and on perpendiculars through these points, the heights, and joining the points so marked off. But, in this machine, the section is to be made by the continued motion of a point acted on by two forces, one of which would carry it in a horizontal line uniformly with the space gone over by the machine, and the other vertically, according as th machine is rising or falling. The machine is thus divided into two distinct parts for effecting these purposes, and the way in which this may be practically effected is described in detail by reference to an isometrical drawing accompanying the paper.

April 25, 1837.

The PRESIDENT in the Chair.

The paper by Mr. Beamish, which had been commenced at a previous meeting (April 2), was concluded.

Mr. Trubshaw presented to the institution a model of the centre employed by him in the construction of the Chester bridge.

The peculiar features of this centre, which is described in detail in the first volume of the Transactions, consist in the absence of horizontal timbers, the timbers being so arranged that their load is received end-ways, and in the lagging being supported over each rib by a pair of folding wedges.

Mr. Trubshaw entered into the details of the construction and method of striking the centre, explanatory of the account contained in the Transactions.

Mr. Macneill explained a method which he had recently adopted of laying down the sections of railways so as to show at once to the eye the position of the cuttings and embankments; and a scale being laid upon the section, their heights and lengths are at once known, in the same way as by measurement on a detached section. This method will be understood by conceiving the line of railway traced on a map of the country, and a coloured part above to represent where a cutting has been made, and a differently coloured part below, where an embankment has been made. The outlines of these will show at once the dimensions of the cuttings and embankments; in engraved plans he should represent the cuttings by lines, and the embankments by dots, or stipling. The usual sections would of course be used by engineers, but a section similar to this would convey at once all the information requisite for Committees. Two or more lines being projected in this way, the reasons for selecting one in preference to the others would, in many cases, appear at a single glance.

Mr. Macneill proposes also to adopt the terms acclivity and declivity with a rate marked after them. Starting then from the

metropolis, or some principal town, all the ascents would be acclivities and the descents declivities. Thus all the information generally required would be conveyed by the inspection of a single section.

May 2, 1837.

The PRESIDENT in the Chair.

The Ordnance maps of England and Wales were received from the Master-General and Board of Ordnance, and the President announced that, by the munificence of Mrs. Chapman, the Institution was to be made the depository of all the professional plans and papers of the late William Chapman, of Newcastle.

Mr. Harrison presented a drawing of the drops of South Shields erected by himself, and gave an account of the method of working them.

Some remarks were made on the various methods which had been employed for representing the nature of a country as to levels and slopes. In one map of Warsaw the level of every point was shown; in the Ordnance maps of France, the heights of most principal points above the level of the sea are noted. With respect to slopes, different degrees of shading might be used advantageously for mountain ground, the gentle inclinations being lightly, and the steep places deeply, shaded. In some Prussian maps they had represented mountain ground by circular lines at assigned distances; the lines being very near for considerable slopes. An objection to this plan is, that the engraver aims at a degree of accuracy which he can rarely arrive at; he cannot easily possess sufficient data to put the lines all round a mountain with any tolerable degree of accuracy.

"On the Velocity of the Water in Belfast Harbour. By William Bald, Civil Engineer, F.R.S.E., M.R.I.A."

The Bay of Belfast, or Belfast Lough, is about eleven miles long by three broad, and has a depth of water varying from two to

eight fathoms at low tide. The bottom consists of mud, and is an excellent holding ground. The mean of thirteen observations assigns the low water line of spring tides, during the months of January and February last, at two feet above the sill of the gate of the new Graving Dock.

The waters of the river Laggan, fed by a basin whose area is two hundred square miles, are discharged into Belfast Bay. The average quantity of rain annually is about thirty-six inches; assuming that *one-third* of this falls into the sea by the Laggan river, the quantity will be equal to *one foot* of depth over the whole basin. The mean daily quantity will be somewhat more than fifteen million cubic feet per day. This is the power combined with the tidal water to keep open the Channel of Belfast.

On a map accompanying this paper, are delineated the velocities of the ascending and descending currents at different states of the tide and parts of the channel.

Mr. Harrison gave, at the request of the President, some information respecting the fuel and fire-boxes of the locomotives on the Stanhope and Tyne Railway. From long experience they found that coal, which contains much bitumen, causes the tubes of the fire-boxes to leak in a very short time. They obtained coal as free from sulphur as possible, and the consequences had been most advantageous; for during two years and a half, not more than 120 tubes had been required for seven engines, of which four were always at work. The tubes were of copper, and $1\frac{5}{8}$ inch in diameter. The usual speed about ten miles an hour. One engine weighing ten tons on six wheels, takes 128 tons of coal. The consumption of fuel is $2\frac{1}{10}$ lbs. of coal per ton of goods per mile. The gross load is more than double the weight of the goods. The cheapness at which they carried was to be attributed to the low speed.

Mr. Carneghie, in reply to a question from the President, stated that the stone-planing machine had not answered for sharp sand stone; but by endeavouring to imitate the mason's tool, and

making the machine work in the same manner as the mason, they had succeeded completely. This tool was a comb with teeth, and curiously enough he had found, at Dresden, a tool which had been in use from time immemorial exactly similar to that which they had adopted.

May 9, 1837.

The PRESIDENT in the Chair.

"On the application of Steam as a moving Power, considered especially with reference to the reported Duties of the Cornish and other Engines. By G. H. Palmer, M. Inst. C.E."

In this paper Mr. Palmer first considers the maximum duty which can be done by atmospheric steam, and then, by reasoning analogically from certain theories, some of which are recognised as established, he infers that highly elastic steam, worked expansively, cannot be as economical as atmospheric steam. The reasoning by which the first question, namely, the amount of duty done, is treated, is as follows:—One bushel, that is, 84 lbs. of coal, will convert 12 cubic feet of water into atmospheric steam, or each cubic foot of water is made to occupy 20,328 cubic feet. This may be applied directly to raise a column of water, say 35 feet high; that is 84 lbs. of coal will, in the absence of all friction, be effective for raising 20,328 cubic feet of water 35 feet high; that is, 1,270,500 lbs. 35 feet high, or 44,573,375 one foot high. Making then the usual deduction of $\frac{4}{10}$ths for friction, according to Tredgold's calculations, we have about 26,000,000 lbs. as the effective duty of the atmospheric steam produced by 84 lbs. of coal.

Mr. Palmer having thus ascertained the maximum duty of 84 lbs. of coal, proceeds to infer that high-pressure steam, worked expansively, must be less efficient than this; and the reasoning by which he arrives at this conclusion is founded on the following theories:—

1. That the sum of the latent and sensible heat is a constant quantity.

2. That all matter, steam of course included, evolves caloric on compression, and absorbs caloric on dilation.
3. That equal quantities of water will always require equal quantities of fuel to convert it into atmospheric steam; but though equal weights of water must absorb equal increments of caloric when atmospheric steam is generated, it does not follow that all the caloric absorbed in high-pressure steam is exclusively supplied by the fuel expended.
4. That steam of two or more atmospheres elasticity does not contain two or more times the quantity of water contained in atmospheric steam, but contains proportionately less water as the pressure under which it is generated is increased.

The preceding principles are illustrated, explained, and insisted on in great detail; and the author infers from them that the high-pressure steam generated by one bushel of coal cannot, when worked expansively, perform more duty than atmospheric steam, unless, as is premised in the earlier part of the paper, more than 62½ lbs. of water can be converted by 7 lbs. of coal from 40 deg. Fahrenheit to atmospheric steam, and unless steam can dilate without converting sensible into latent caloric.

List of Patents

Granted by the French Government from the 1st of July to the 30th of September, 1837.

PATENTS FOR FIFTEEN YEARS.

To Samuel Emden, merchant, of London, represented in Paris by Mr. Perpigna, advocate of the French and Foreign Office for Patents, Rue Choiseul, for a method or process of treating the refuse of seed oils, commonly called black-foots.

— Guillemin Lambert, gunsmith at Autun, represented in Paris by Mr. Perpigna, for improvements in guns.

To William Higgins, of Manchester, represented in Paris by Mr. Perpigna, for improvements in spinning.
— Devilaine and Co., of Paris, represented by Mr. Perpigna, for an improved process of rendering woven goods waterproof.
— Pierre Theodore Guérin, represented by Mr. Perpigna, for an improved rocket to be used in whale fisheries.
— Dupuy de Grandpré, of Bordeaux, represented by Mr. Perpigna, for improvements in axletrees.
— Jean Antoine Cadier, of Lyon, represented in Paris by Mr. Perpigna, for an improved loom.
— Michael Emmanuel Valadon, of Paris, represented by Mr. Perpigna, for an improved stopper applicable to vases, calculated to admit and emit by the said orifice, solid or liquid substances.
— Claude David, of Paris, represented by Mr. Perpigna, for an improved system of machines for making barrels.
— Henri Noel Jac, represented by Mr. Perpigna, for improvements in lamps.
— Marie Letestu, of Paris, for an improved lock.
— Georges Crane, of London, for an improved method of applying anthracite to the melting of iron ore.
— Jean Werly, of Bar-le-duc, for improvements in ladies' stays.
— Alexis Durmoulin, of Lyon, for a new system of steam-navigation.
— Pierre Bernardet, of Paris, for an improved system of apparatus for compressing gas.
— Jean Jacques Gardissal, of Paris, for an improved machine for the extraction of earth in the digging of canals.
— Jean Nicolas Gannal, chemist, of Paris, for an improved method of embalming and preserving dead bodies.
— Auguste Pihel, of Paris, for an improved Jacquart-loom.
— Jean Louis Vergniais, civil-engineer, of Lyon, for an improved hydraulic machine.
— Jean Joseph Bemindt, of Rouen, for an improved printing machine.
— Nathaniel Neal Solly, of London, for an improved apparatus for the puddling of iron.

To Julien François Grimoux, of Saumur, for an improved system of propelling carriages.

— Chalers Dearme, of Paris, for improvements in the manufacturing of plate-glass.

— Colle and Jaubert, of Marseille, for a process of converting palm oil into soap.

— Augustin Chameroy, of Paris, for the manufacturing of pipes, tubes, and hollow bodies with *asphaltem* and *bitumen*, combined with vegetable or animal fibres.

— Elzeard Degrand, civil-engineer, of Paris, for a method of drying animal or vegetable substances.

— Rochrig and Boucquau, brewers, of Paris, for an improved method of manufacturing beer, ale, and porter.

— Charles Gabriel Jacquemet, of Bordeaux, for a method of using vapours and gas in re-action engines.

— Louis Molinie, of Paris, for a governor applicable to steam or hydraulic-engines.

— Henri Pape, of Paris, for improvements in pianos.

— Jean Baptiste Journeaux, of Metz, for improvements in the manufacturing of double-edged instruments.

— Louis Isaac Soubeiran, of Gard, for improvements in the twisting of silk.

— Charles Louis Derosne, of Paris, for a process of disinfecting night-soil.

— Pierre Jauffret, of Paris, for a method of manufacturing an economical manure.

— Jean Baptiste Raquin, of Paris, for a method of manufacturing with gluten, small bottles for the reception of copahu.

PATENTS FOR TEN YEARS.

— To John Roberts, of Prestolle, represented in Paris by Mr. Perpigna, for certain improvements in the art of block-printing.

— Charles de Ganahl, of Austria, represented in Paris by Mr. Perpigna, for improvements in looms.

— Théodore Swartz, of Stockholm, represented by Mr. Perpigna, for an improved railway.

To Loyer Bouchette, and Darbois, of Metz, represented in Paris by Mr. Perpigna, for improvements in steam-engines.

— Bon, Boilley, Cornu, and Robert, of Dole, represented in Paris by Mr. Perpigna, for the manufacturing of an improved tinder.

— Bazile Ducel, of Lyon, represented in Paris by Mr. Perpigna, for an improved steam-generator.

— Joseph Benjamin Cauchy, of Amiens, for a cylindrical machine, to be driven by horses.

— Philippe Felix Dubois, of Cherbourg, for a syrup for the cure of the gout and rheumatisms.

— Antoine Jérome Bolard, for a method of extracting sulphate of soda from sea-water.

— Honnorat and Besset, of St. Etienne, for an improved gun.

— Hutinot, of Compiegne, for an improved pump.

— Jean Felix Bapterosses, of Bierre, for a new mechanical lamp.

— Edme Jacques Rousselet, of Paris, for an improved printing-press.

— Mention and Wagner, of Paris, for a method of employing in jewellery, platina combined with other metals.

— Edme Jacques Rousselet, of Paris, for a new printing-machine.

— Hench Brothers, printed cotton-manufacturers, of Rouen, for a new machine for printing woven goods.

— André Charles Favre, of St. Maixant, for an instrument called by him metrocycle.

— De Caen, Brothers, of Grigny, for improvements in the manufacturing of pottery.

— Victor Hourgau, of Angers, for an improved flour-mill.

— Eugéne Diacon, of Anjouty, for a composition operating the destruction of bugs.

List of Patents

Granted in Scotland between 22*d February and* 22*d March*, 1838.

To Sir James Caleb Anderson, of Buttevant Castle, in the county of Cork, for certain improvements in locomotive-engines, which are partly applicable to other purposes.—3d March.

— Morton William Laurence, of Lemon-street, London, sugar-refiner, for improvements in the process of concentrating certain vegetable juices and saccharine solutions.—6th March.

— John Clark, the younger, of Mile-end, Glasgow, cotton-spinner, for improved machinery for turning, some part or parts of which may be applicable to other useful purposes.—6th March.

— John Edwards, of Lincoln's Inn-fields, pen-manufacturer, for certain improvements in instruments used in writing.—8th March.

— Julian Augustus Turner, of Henry-street, Liverpool, architect, for an improved method of propelling vessels through water.—13th March.

— Eugene Richard Ladislas de Breza, of Paris, now of St. Martin's-street, London, for a chemical compound for rendering cloth, wool, paper, and other substances indestructible by fire; and also preserving them from the ravages of insects.—19th March.

— John Paterson Reid, power-loom manufacturer, of Glasgow, and Thomas Johnson, mechanic there, for certain improvements in preparing yarn or thread by machinery, suitable for warps in preparation for weaving in looms.—22d March.

New Patents
SEALED IN ENGLAND.
1838.

To Josiah Pearce Holebrook, of Devonshire-place, Edgeware-road, gentleman, for his invention of an improved method or improved methods of propelling vessels.—Sealed 27th February—6 months for inrolment.

To John Danforth Greenwood, and Richard Wynn Keene, of the Belvedere-road, Lambeth, manufacturers, for their invention of an improvement in the manufacture of cement, and in the application of cements and other

earthy substances to the purpose of producing artificial surfaces.—Sealed 27th February—6 months for inrolment.

To Hippolyte François de Bouffet Montauban, Colonel of Cavalry, of Sloane-street, Chelsea, and John Carvalho de Medeiros, of Old London-street, merchant, for certain improvements in the means of producing gas for illumination, and in apparatus connected with the consumption thereof, being a communication from a foreigner residing abroad.—Sealed 28th February—6 months for inrolment.

To William Westley Richards, of Birmingham, gun-maker, for his invention of an improved primer for fire-arms.—Sealed 2d March—6 months for inrolment.

To Charles Fletcher, of Stroud, in the county of Gloucester, mechanist, for his invention of certain improvements in the construction of looms for weaving.—Sealed 5th March—6 months for inrolment.

To William Lewis, of Brimscomb, in the county of Gloucester, and John Ferrabee, of Thrupp Mill, in the same parish, for their invention of certain improvements in machinery for dressing woollen and other cloths or fabrics requiring such a process.—Sealed 5th March—2 months for inrolment.

To Henry Bessemer, of City-terrace, City-road, engineer, for his invention of certain improvements in machinery or apparatus for casting printing-types, spaces, and quadrats, and the means of breaking off and counting the same.—Sealed 8th March—6 months for inrolment.

To William Hale, of Greenwich, engineer, for his invention of improvements in steam-engines, and apparatus connected therewith, and in machinery for propelling vessels.—Sealed 8th March—6 months for inrolment.

To Morton William Lawrence, of Lemans-street, Good-

man's-fields, sugar-refiner, for his invention of certain improvements in the process of concentrating certain vegetable juices and saccharine solutions.—Sealed 8th March —4 months for inrolment.

To John Seaward, of the Canal iron-works, Poplar, engineer, for his invention of an improvement or improvements in steam-engines.—Sealed 10th March—6 months for inrolment.

To Charles Schroth, of Sabloniere's hotel, Leicester-square, gentleman, for certain improvements in preparing, pressing, and embossing the surface of leather, being a communication from a foreigner residing abroad.—Sealed 10th March—6 months for inrolment.

To Thomas Evans, of the Dowlais iron-works, agent, for his invention of an improved rail for railway purposes, together with the mode of manufacturing and fastening down the same.—Sealed 10th March—6 months for inrolment.

To Abraham Parker, of Gower-street, Bedford-square, surveyor, and Oliver Byrne, of the same place, professor of mathematics, for their invention of a new instrument for gauging malt, and also for gauging the fluid or solid contents of casks and other vessels.—Sealed 10th March —6 months for inrolment.

To William Dale, of Marsh-street, Stafford, turner, for his invention of certain improvements in constructing columns, pillars, bed-posts, and other such like articles.—Sealed 14th March—6 months for inrolment.

To Thomas Joyce, of Camberwell New-road, gardener, for his invention of certain improved modes of and apparatus for applying prepared fuel to various culinary and domestic puroses.—Sealed 15th March—6 months for inrolment.

CELESTIAL PHENOMENA, for April, [illegible].

D.	H.	M.	
1			Clock before the sun, 4m. 2s.
—			☽ rises 8h. 57m. M.
—			☽ passes mer. 6h. 6m. A.
—			☽ sets 2h. 21m. M.
	9	33	☽ in □ or first quarter.
5			Clock before the sun, 2m. 49s.
—			☽ rises 1h. 39m. A.
—			☽ passes mer. 9h. 18m. A.
—			☽ sets 4h. 25m. M.
	6	59	☿ in the ascending node.
6	4	45	♃ in conj. with the ☽ diff. of dec. 1. 38. S.
	5		☽ in Apogee.
7	19	47	♃'s first satt. will em.
9			Partial eclipse of the moon.
	11	10	First contact with Penumbra.
	12	32	First contact with dark shadow.
	13	58	Middle of eclipse.
	15	25	Last contact with dark shadow.
	16	46	Last contact with Penumbra.
	20	27	☿ in Perihelion.
	20	45	♀ at greatest brilliancy.
10			Clock before the sun, 1m. 23s.
—			☽ rises 7h. 36m. A.
—			☽ passes mer. morn.
—			☽ sets 5h. 16m. M.
	2	6	Ecliptic oppo. or ○ full moon.
11	8	27	Vesta in conj. with ☿ diff. of dec. 6. 13. S.
12	10	34	♄ in conj. with the ☽ diff. of dec. 6. 16. N.
13	2	25	♀ in conj. with ♅ diff. of dec. 3. 30. N.
14	14	41	♃'s first satt. will em.
15			Clock before the sun, 0m. 3s.
—			☽ rises 0h. 45m. M.
—			☽ passes mer. 4h. 0m. M.
—			☽ sets 7h. 12m. M.
16	9	10	♃'s first satt. will em.
	9	53	♃'s second satt. will em.
17	3	30	☽ in □ or last quarter.
19			Mer. R. A. 2h. 59m. dec. 19. 24. N.
—			Venus R. A. 23h. 6m. dec. 4. 8. S.
—			Mars R. A. 1h. 5m. dec. 6. 13. N.
19			Vesta R. A. [illegible] dec. 9. 15. N.
—			Juno R. A. [illegible] dec. 7. 44. S.
—			Pallas R. A. 4h. [illegible] dec. 4. 56. S.
—			Ceres R. A. 5h. 53m. dec. 27. 46. N.
—			Jupiter R. A. 10h. [illegible] dec. 9. 25. N.
—			Saturn R. A. 15h. 43m. dec. 17. 21. S.
—			Georg. R. A. 22h. 51m. dec. 8. 5. S.
—			Mercury passes mer. 1h. 10m.
—			Venus passes mer. 21h. [illegible]
—			Mars passes mer. 23h. 10m.
—			Jupiter passes mer. 8h. 55m.
—			Saturn passes mer. 13h. 52m.
20			Clock after the sun, 1m. 7s.
—			☽ rises 3h. 47m. M.
—			☽ passes mer. 8h. 43m. M.
—			☽ sets 1h. 54m. A.
	4	6	♅ in conj. with the ☽ diff. of dec. 2. 17. N.
	12	29	♀ in conj. with the ☽ diff. of dec. 4. 5. N.
21	20		☽ in Perigee.
22	22	20	♂ in conj. with the ☽ diff. of dec. 1. 29. S.
23	11	4	♃'s first satt. will em.
	12	30	♃'s second satt. will em.
24	7	1	Ecliptic conj. or ● new moon.
	20	10	☿ greatest elong. 20. 29. E.
25			Clock after the sun, 2m. 7s.
—			☽ rises 4h. 59m. M.
—			☽ passes mer. 1h. 1m. A.
—			☽ sets 9h. 24m. A.
	7	45	☿ in conj. with the ☽ diff. of dec. 50. S.
	10	5	♃'s third satt. will em.
30			Clock after the sun, 2m. 54s.
—			☽ rises 8h. 57m. M.
—			☽ passes mer. 5h. 42m. A.
—			☽ sets 1h. 43m. M.
	9	35	♀ in the descending node.

J. LEWTHWAITE, Rotherhithe.

THE

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No. LXXIV.

Recent Patents.

methods of scouring the metal will answer; but the one which has been found to answer best, is the immersion of the metal in water acidulated with sulphuric acid. The acidulated water should be heated in a leaden vessel, or it may be used cold in wooden vessels; the metal is to be introduced into the acid and water, and if in sheets, must be placed vertically. The metal, either iron or copper, must remain in the acidulated bath only a sufficient time for the removal of the oxide. As soon as that is accomplished, the pieces of metal operated upon are taken out of the acidulated bath and thrown into cold water, from whence each piece is taken separately and scoured, with sand and a piece of cork: the metal is rubbed with a brush as the scouring proceeds; and when this operation is performed, the pieces of metal are thrown into clean water. Small articles, such as nails, need not be scoured with sand; they are allowed to remain longer in the acidulated bath, and are merely washed when taken out.

The iron and copper so prepared might remain some time in the water without any oxydation taking place, but not so when the preparation of the metal is effected as follows, that is to say, by dipping the pieces of metal separately, when they are not too small, in a solution of sal ammoniac, or, what is preferable, in water acidulated with muriatic acid. This bath is made of nearly equal quantities of acid and of water. The metal pieces, when taken out of this bath, must be dried immediately, and coated with as little delay as possible, for within two hours after being immersed in the muriatic acid the iron would rust. The pieces of metal may be dried by holding them over a reverberating furnace, of which we shall speak hereafter.

Zinc coating given to sheet iron or copper, or largest pieces of such metals:—The first coating is given with zinc, which must be melted in a crucible of earthenware, or if it

be made of cast iron, the crucible must be lined internally with bricks, or with an earthen lining of some kind, in order to prevent any contact between the cast iron and the melted zinc, otherwise an alloy of zinc and cast iron would thus be produced, which would prevent the zinc from adhering to the metal operated upon. Cast iron vessels, of a shape similar to those employed for the tinning of sheet iron, may be used for this operation, provided they be internally lined with fire-bricks well joined together with potters' clay.

The zinc being melted, it must be skimmed carefully, and its surface covered with sal ammoniac, or any flux. The pieces of copper or iron previously prepared, as stated, are introduced into the melted metal; they must be moved about in the melted zinc, and drawn out slowly to avoid taking up too much zinc; and, if possible, before the zinc adhering to the surface of the iron or copper has become set, these pieces must be thrown into clean water, and rubbed therein with a sponge or a brush; they are then dried rapidly, by passing them through bran or sawdust. It is necessary to wash and dry the pieces of metal immediately after they have received the zinc coating; without this precaution, the zinc coating would be defaced by black spots. When prepared, as stated, they are white, and might be made still more so if rapidly dipped in water acidulated with sulphuric acid previously to being thrown into the clean water.

The metal zinc must not be too warm; the operation of coating with zinc must begin shortly after the zinc has become fused. If the zinc were too hot, it would rapidly volatilize the sal ammoniac, which must at all times cover its surface. When plates of small dimensions, and of the ordinary size of tin plates, are to be coated, several may be done at once: they are to be placed vertically in a grated case held by two handles; the plates should be kept apart

by means of a separation formed by iron wires fixed to the grating.

In this operation, to save as much fuel and sal ammoniac as possible, two workmen must be employed for each vessel. These workmen, placed opposite to one another, are to be provided with a grated case each. Large pieces of metal must be singly introduced into the fused metal by means of tongs or forceps, the jaws of which must form an acute angle, in order to leave smaller marks on the metal. The large pieces of metal must be introduced very slowly into the melted zinc, for without that precaution an explosion might take place, and the melted zinc be projected out of the vessel.

When the plates of metal warp in consequence of the heat of the zinc into which they are dipped, or if their surface is uneven, they must be rolled; and to avoid their departing still more from their original form when passing through the rollers, these metallic plates must be powdered with wood ashes, rosin, or any other pulverised substance, which will prevent the rollers sliding over any portions of the plates.

When large chains are to be coated, they are to be prepared in the manner described for the other large pieces, only, when they are taken out of the melted zinc, they are to be shaken, in order to hinder the links from becoming soldered to one another.

Preparation and coating of small pieces of metal, such as nails, small chains, &c.:—These small pieces of metal are dipped into the acidulated bath, as described, and must be moved about so that the acid may act equally on every part, and that by the friction of these pieces or links against one another, the oxide may be removed. They are then dipped in muriatic acid and dried in a reverberatory furnace, and the coating of zinc is given in the following manner:—

These pieces are thrown altogether in the melted zinc, covered with sal ammoniac, and there left for perhaps the space of one minute. They are taken out slowly with an iron skimmer, and by small portions at a time, in order to allow them to drop as much as possible of the zinc they have taken up. All these pieces so removed are necessarily held in contact, or soldered together, as they still retain a great deal too much zinc: to free them, therefore, from this excess of zinc, and detach them, they are to be put altogether in a reverberatory furnace and covered with charcoal. A red heat is to be maintained during about a quarter of an hour, and the mass is moved and shaken by means of a large iron poker, until the pieces of metal have discharged the excess of zinc they had taken up; they are then drawn to the front of the furnace by means of an iron rake, and the whole must be shaken about until the zinc becomes set; the remainder of the process is the same as for large pieces of metal. The zinc for coating small pieces of metal, and especially nails, must be melted in a small crucible, to avoid the possibility of spoiling a great quantity of zinc; for if any iron be left for a certain time in the melted zinc, the latter can no longer be used for coating metal. The zinc used for the purpose of coating must be very pure.

To prepare wire, it must be made to pass horizontally through the melted zinc, covered with sal ammoniac. The wire, prepared in the manner described, is placed on a drum and introduced into the vessel, and made to pass through the zinc, and maintained in a proper direction by any suitable contrivance; when it emerges from the zinc, it is to be rolled on another drum, and must be afterwards cleaned, as described above.

The galvanic paint having the property of preserving iron and copper from oxydation is composed of zinc powder,

well ground and mixed with the substances generally employed for painting. All substances are not equally suitable for preparing the galvanic paint; the oils distilled from coal tar answer very well for this purpose: coal tar itself, to which must be added one-third of the quantity of spirit of turpentine, will produce a very good result, but owing to its very disagreeable odour, it cannot be used for all purposes.

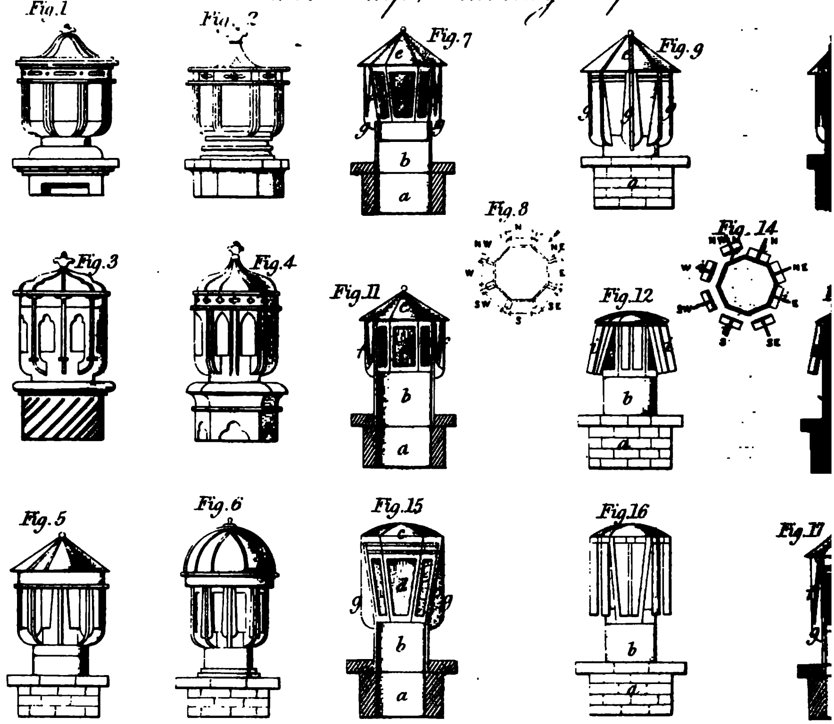
The second coating is more particularly applied to sheets, or large pieces of metal; the necessity of applying it will but rarely occur, and only in cases where the zinc coating might be corroded by the contact of certain substances, or when the vessels intended to be made of metal coated with zinc are to receive acids, or be used in the preparation of food. Pure tin, or, in some cases, tin mixed with two-thirds of lead, may be used for this object. These metals are melted in a cast iron crucible.

The pieces which are to be tinned must be rubbed with a sponge or a brush moistened with a solution of sal ammoniac, or with a solution of muriatic acid; and the pieces of metal thus moistened are dipped in the melted tin, or tin and lead, which must be covered with a layer of fat or tallow at least two inches thick. The fused metal must be very hot, and nearly hot enough to inflame the fat: the pieces must be dipped rapidly in the fused metal, one by one, but must be drawn out slowly, that the tin may cover the whole of the zinc.

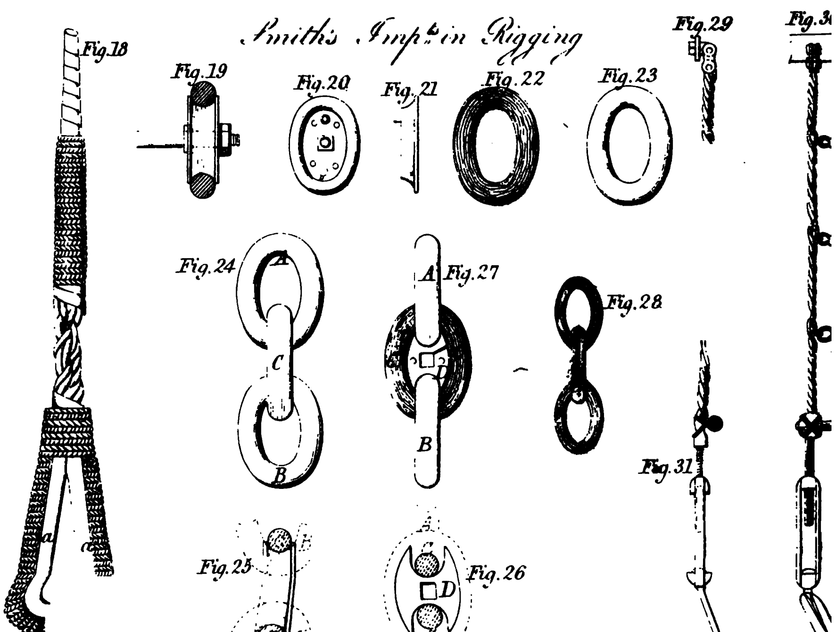
The pieces operated upon must not be drawn out too slowly, for in that case the zinc might quit them, and thus not only the whole of the fused metal would be spoiled, but, moreover, a portion of the zinc coating being removed, the metal would be exposed to oxydation.—[*Inrolled in the Rolls Chapel Office, October*, 1837.]

Specification drawn by Messrs. Newton and Berry.

Bull's Impd Chimney Caps



Smith's Impt in Rigging



To REUBEN BULL, *of Adam-street West, Portman-square, in the parish of St. Marylebone, and county of Middlesex, ironmonger, for certain improvements in chimney-caps, to facilitate the discharge of smoke and prevent its return.*—[Sealed 15th April, 1837.]

THESE improvements in chimney-caps are designed to allow the smoke to discharge itself freely from the chimney, whatever may be the state of the wind. The top of the cap is covered by a dome of a spherical, conical, or curved ornamental form, which prevents any sudden descent of gusts of wind from driving back the smoke down the chimney; a circumstance that often happens in open-mouthed chimney tops. The apertures for the escape of the smoke are in lateral directions all round the cap, and these are guarded externally by pendant, vibrating or moveable flaps or shutters. The smoke, after entering the chimney-cap, passes into lateral chambers, and thence discharges itself upwards or downwards, through openings, into the atmosphere. The pendant or moveable flaps or shutters protect the lateral apertures of the cap from the action of the wind, passing horizontally from whatever point it may blow; and when the wind is powerful, those flaps or shutters which face the wind are pressed inward, closing the lateral apertures of the cap on that side; but the flaps or shutters on the opposite side not being acted upon in this way by the wind, allow the smoke to pass freely from the cap into the lateral chambers, and thence to escape, as aforesaid, through the openings to the atmosphere; so that whatever may be the state of the wind, its intrusion into the chimney is precluded by the pendant, vibrating or moveable flaps or shutters, and a free passage is afforded on that side opposite to the wind: in addition to which, the warmth thus preserved in the interior of the chimney-cap facilitates the

draft, and the enlarged space or capacious receptacles formed round the cap by the lateral chambers, afford ample room for the ready escape of the smoke from the chimney.

These chimney-caps may be made in a great variety of tasteful and ornamental forms, some examples of which I have shown in the accompanying drawings, but to which, of course, I by no means intend to confine myself, as the leading feature of my improvement consists in the manner of adapting pendant, vibrating or moveable flaps or shutters in connexion with lateral openings and lateral chambers, as more particularly shown in the drawings which I am now about to explain.

The several figures 1, 2, 3, 4, 5, and 6, in Plate IV., are different representations of one construction of my improved chimney-caps, with pendant flaps or shutters adapted thereto. Fig. 7, is a vertical section of the same construction, and of the form or design shown at fig. 5: *a*, is the chimney top, to which the lower part of the funnel *b*, of the chimney-cap is fastened in any proper manner, and may be used with or without a common chimney pot, as shown in the drawings; *c*, *c*, is the internal framework of the cap, in which the lateral apertures *d*, *d*, are formed for the escape of the smoke from the interior. The framework, in this instance, is formed as an inverted cone; *e*, is the dome or cover of the cap; *f*, *f*, are the pendant flaps or shutters which are attached or hung to the top part of the framework *c*, by hinge joints, in any convenient manner, so that, as they hang pendant by their own gravity, the apertures *d*, *d*, in the inclined side of the frame, will be left open, and when the wind blows hard the flaps will be forced inward, and close the openings opposite to them; *g*, *g*, are partitions or projecting wings fastened on to the side of the framework *c*, and funnel *b*: these wings divide the space around the framing *c*, into separate chambers, and they are

furnished with outer flanges *h, h,* which serve to prevent the flaps from moving too far outwards, and also to direct the action of the wind upon those flaps situated facing it, and, at the same time, prevent the wind acting upon those flaps which are at the sides, or not directly facing the wind, as will be best seen in the horizontal section, fig. 8, where it will be seen that, supposing the wind to be blowing from the N.E., the flaps or shutters 1, 2, 3, next the wind will close the apertures opposite to them, and all the others, 4, 5, 6, 7, 8, will remain open, allowing a free discharge of the smoke therefrom.

Fig. 9, is an outside view of another construction of my improved chimney-caps, in which the flaps or shutters are not pendant, but are hinged or jointed at the bottom part, and the smoke escapes from the outer apertures *d, d,* at the top part of the cap, underneath the cover or dome. The same letters of reference being marked on corresponding parts as in the former figures, the above description will suffice for these.

Fig. 11, is a section of another modification of my improved chimney-caps, with pendant flaps or shutters, in which the interior framing *c,* is formed as a cylinder, and the pendant flaps or shutters are bent and cranked at the upper part, so that as they hang pendant by their own gravity, the apertures *d, d,* will remain open; but when the wind acts upon the flaps or shutters, they will be made to close the openings. The same letters of reference are also marked on this figure.

Figures 12, 13, and 14, represent another modification of my improved chimney-cap, in which the projecting wings or partitions *g,* are dispensed with; and I have adapted other projecting wings *i, i,* attached to the pendant flaps or shutters *f*: these wings prevent communication with the next flap or division. Fig. 12, is a front

elevation with the cap or cover *e*, shown in section, in order to show more distinctly the method of hanging the shutters or flaps. Fig. 13, is a transverse section taken through the entire chimney-cap; and fig. 14, is a horizontal section, for the purpose of showing the pendant shutters with the projecting wings attached thereto. These figures are a modification of the construction described under fig. 11, the shutters or flaps being hung in the same manner.

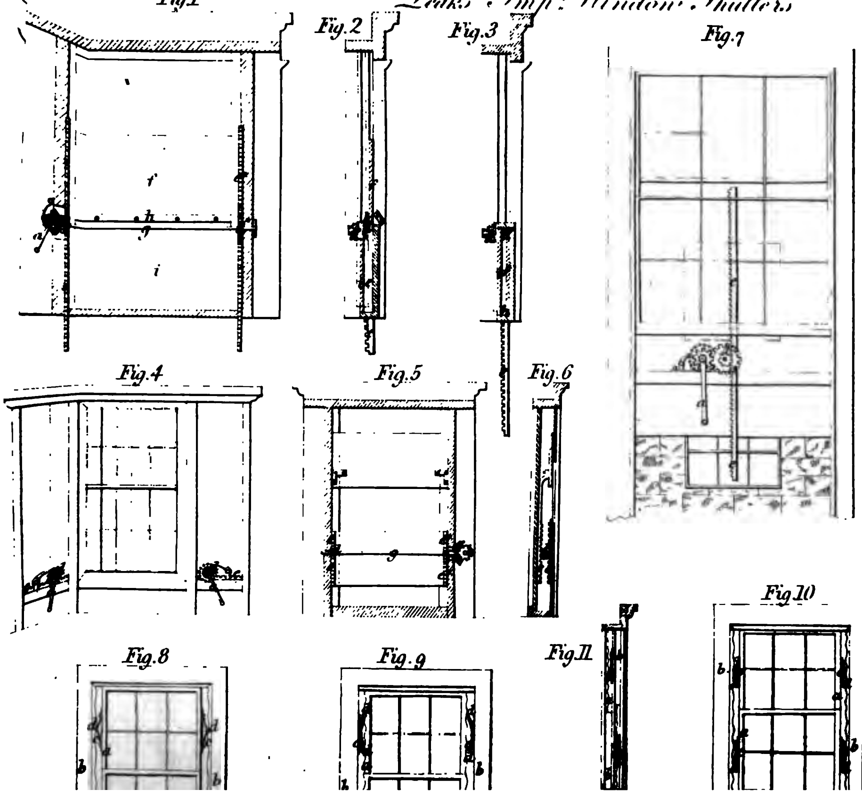
Fig. 15, represents another modification of my improved chimney-cap, the shutters being hung in the same manner as those in fig. 7, but the flanges attached to the projecting wings *g*, *g*, are dispensed with.

It may be thought desirable, in order to ensure the proper action of the shutters or flaps, to connect them in pairs, the one opposite the other, by means of rods which are jointed or connected to the inner side of the flaps or shutters, so that upon any of them being forced inward by the wind to close the apertures *d*, *d*, the rods will by their connexion force the opposite shutters or flaps outward, and ensure their opening and a free exit for the smoke; and the extent of their opening will be determined by the length of the rods. This is shown applied to the flaps or shutters in these figures: *j*, *j*, are the rods connecting the flaps together in pairs, and *k*, is a false top, to prevent the rods from being clogged up by the soot.

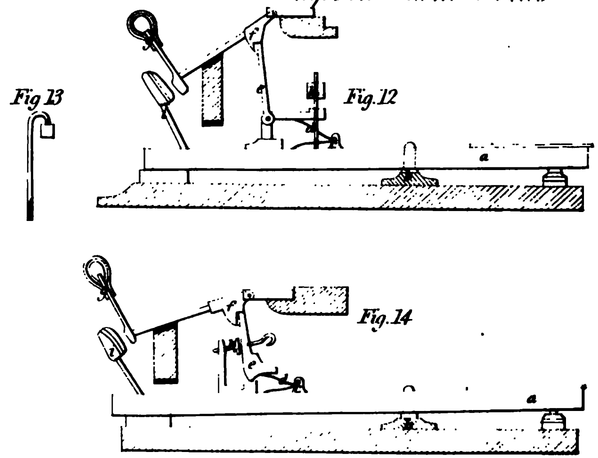
Fig. 16, is a front elevation of another modification, in which the framing *c*, is conical, and the flaps or shutters being hung in the same manner as in fig. 7, but the projecting wings are dispensed with, the wings being attached to the pendant flaps or shutters, as shown in figs. 12, and 13.

Fig. 17, is another modification, in which the framing *c*, is cylindrical, and the apertures are kept open by means of

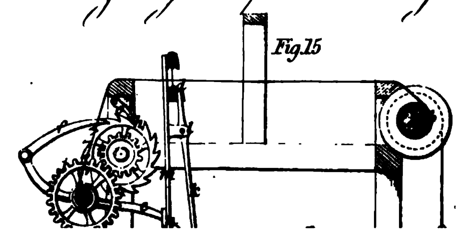
Leak's Impd Window Shutters



Stewart's Impt in Piano Fortes



Gilroy's Impt in Weaving



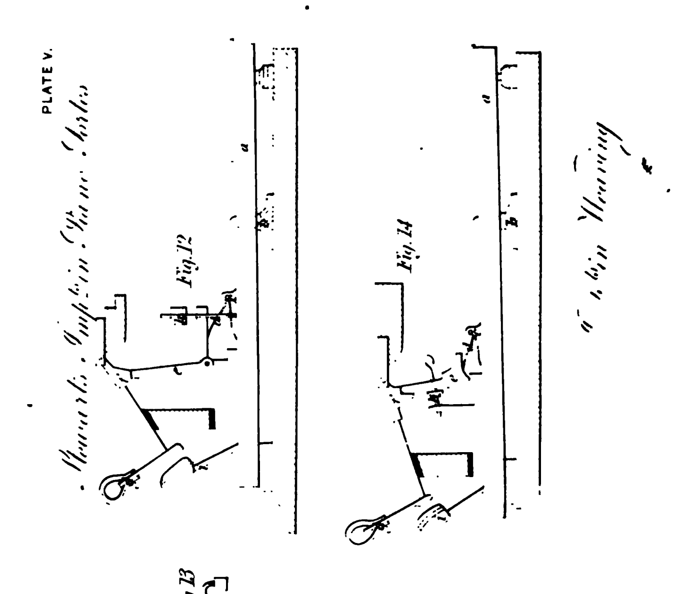
rods attached to the pendant flaps or shutters, as in fig. 15. It will be perceived that the connecting rods are longer than the diameter of the cylinder, and thus the apertures *d, d,* are always kept open, except when some of the flaps or shutters are forced inwards by the action of the wind. I would here remark, that these rods may be applied to the construction of chimney-caps, in which the flaps rest upon the hinge-joint, as shown at figs. 9, and 10; and that the edges or other parts of the flaps or shutters, or the edges of the apertures *d,* and of the flanges *h,* should be supplied with a leather cloth case, or other packing or lining, to prevent noise.

And in conclusion, I hereby declare that I do not intend to confine myself to any particular form or figure of my improved chimney-caps, or to the number of flaps or shutters used therein, nor to the situation in which they are placed in the chimney-cap, as they may be placed in rows one above another, or all side by side, as shown in the drawings.—[*Inrolled in the Rolls Chapel Office, October,* 1837.]

Specification drawn by Messrs. Newton and Berry.

To Elijah Leak, *of Hanley, in the parish of Stoke, and county of Stafford, engineer and lathe-maker, for his invention of certain improvements in the construction of shutters and sashes for windows of buildings, which are applicable to hothouses or conservatories, and carriages and other purposes, and in the mode of fitting or using the same.*—[Sealed 23d May, 1837.]

This invention of certain improvements in the construction of shutters and sashes for windows of buildings, consists, in the first place, in the adaptation of improved arrange-



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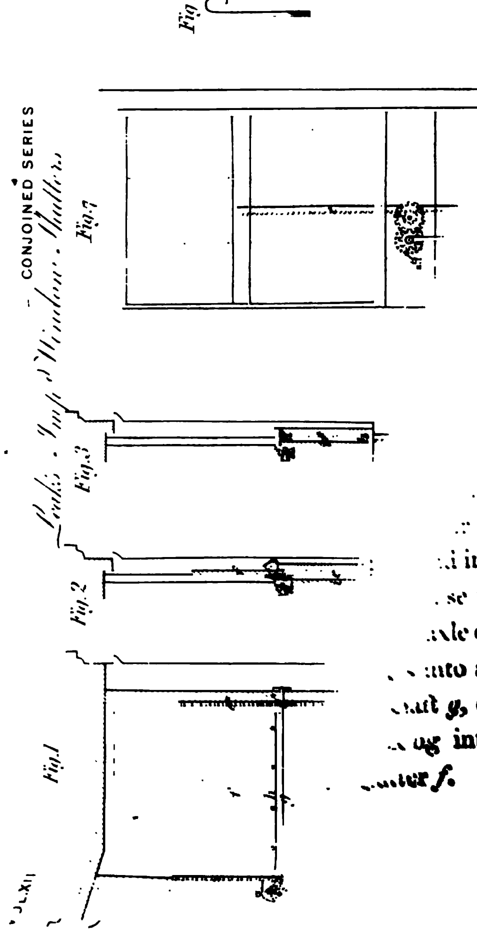
section to fig. 2, the shutters
i in their case.
se the shutters, motion is given
axle of which a small bevel pinion
into another larger bevel wheel *c*;
aft *g*, of this wheel is fastened ano-
g into the rack *e*, attached to the
utter *f*. The shaft *g*, extends across



ing in proper bearings;
' another pinion d^*,
seen, that as
given to the
d, and by that
this shutter has
1, and 2, a project-
n a similar projecting
shutter *i*, and by this
raised, until it is free from
ired, a hinged lid or top may
ox, so as to be turned over and
the case, the lower shutter being
s lid. In order to prevent the upper
g down when the winch is taken off or
wheel is placed on the axis of the pinion
or click taking into its teeth, thereby pre-
return; and when it is desired to let down or
shutters, they are finally to be raised sufficiently
the lid of the shutter case, and the pall or click is
taken out of the teeth of the ratchet wheel; the
ters will then descend with ease. When the top shutter
descends, it brings the lower shutter with it into the shutter
box; the lid may then be turned over, and the whole will
be covered up.

Another modification of my improved shutters is shown at fig. 4, which may be applied in situations where the former would be inconvenient or impracticable: this figure represents a front elevation, as seen from the inside, the shutters being partly closed. In this modification, the shutters are adapted to the sides of the window, and slidden forwards and backwards in grooves formed in the upper and lower timbers of the window framing, and are moved by their separate racks and pinions, which, in this instance,

are applied to the lower part of the shutters, the shutters meeting in the middle of the window seat. Fig. 5, represents a longitudinal section of a window frame in which there are two shutters adapted, the one descending and the other ascending.

In this arrangement the shutters counterbalance each other as they are brought together. The two shutters are connected by a double rack on each side, with one pinion working in their teeth, so that as one shutter ascends the other descends, moving simultaneously, and meeting in the middle. Fig. 6, is a transverse section of the same, showing the pinion *d*, working in the double rack *e*, *e*. This modification may also be made to work sideways, (as that in fig. 4,) the shutters being closed simultaneously, the wheels and pinion being placed on one side only of the window in the middle.

Fig. 7, represents another arrangement, in which the window is protected by one shutter only, it being raised from below. This arrangement is adapted for situations where there is a cellar or kitchen below; and in order to admit light into the lower or basement story, an aperture is made in the shutter and fitted with a door, to be opened when the shutter is down, and closed and fastened with a bolt when up. In this figure the rack and pinion movement is placed in the middle of the shutter, but it may be applied with equal advantage at both sides, as in fig. 1, the same letters referring to similar parts as in the former figures: *j*, is the aperture for admitting light to the kitchen. The door is hinged, and closes the aperture when the shutter is up; but when down, the door opens outwards and admits the light.

Having now described the first part of my invention, viz. improvements in the construction of shutters for windows of buildings, I would observe, that as the same letters of reference denote similar or corresponding parts in

all the figures, it will not be requisite to describe more minutely the construction, adaptation, and working of all the different modifications of shutters herein shown, as any person may readily understand the construction and use of the several parts, by referring to the description of figs. 1, 2, and 3.

The second part of my invention, viz. improvements in the construction of sashes for windows, consists in the adaption of what I call an "ebb or waved-rack," with springs to be used in place of the ordinary sash-line and counterbalancing weight.

Fig. 8, represents a front elevation of a window sash and framing, part of the lattice being removed to show more distinctly my improvements; *a*, is the window sash; *b*, the framing of the window with the ebb-rack, formed and placed therein; *c, c*, are springs having small rollers *d, d*, mounted in them; these rollers run over the projecting parts of the rack as the sash is raised or lowered, and when the sash has been raised, it may be left at any required height, being there retained by the springs pressing the roller *d*, into the recesses of the rack, and thereby firmly holding it until it is again moved.

Fig. 9, is a similar view, but in this instance the ebb-rack is formed on the sash, the springs being stationary, and fixed to the side of the window framing. The springs, in this instance, act upon two levers *e, e*, carrying the rollers *d, d*, on their ends, the levers being pressed outward against the ebb-rack by the springs.

Fig. 10, is a view of a detached portion of the sash-frame, having a fluted rack made in it, with another description of spring. Fig. 11, is a transverse section, taken through the window, representing another modification of the ebb-rack: in this figure the rack is formed upon the front part of the sash, and the springs are stationary. The springs in all

these modifications are made of steel, but they may be made of any other suitable metal, and also of any tough wood.

In conclusion, I would observe that both my improvements are applicable to carriage windows and other situations; and as they may be readily applied by any mechanic, I have not thought it necessary to show the further adaptation thereof in the drawings; but I will remark, that in applying my improvement to carriage and such other windows, for the purpose of opening and closing the same, I propose to place a small rack up the middle bar of the sash, after the manner shown in fig. 7, or to have two racks, one at each side, as shown in fig. 1; and I also can adopt the second part of my invention, viz. the ebb-rack and springs to the same purposes. These improvements are also applicable to the moving of the sashes and windows of hothouses or conservatories, and many other places.

Having now described my improvements, and the manner of carrying the same into effect, I wish it to be understood that I do not mean or intend to claim as my invention the application of the springs by themselves to window sashes, as that has been before done; but what I claim as my invention is, firstly, the adaptation of rack and pinion movements, to the raising and lowering, or otherwise moving shutters and windows, as above described and set forth; and, secondly, I claim the construction and adaptation of racks either ebbed, fluted or otherwise indented or corrugated, in conjunction with the retaining springs applied to windows and sashes, for the purpose of retaining the sash at any required height, as above described.—[*Inrolled in the Rolls Chapel Office, October*, 1837.]

Specification drawn by Messrs. Newton and Berry.

To Peter Spence, *of Henry-street, Commercial-road, in the county of Middlesex, chemist, for his invention of certain improvements in the manufacture of Prussian blue, prussiate of potash, and plaster of Paris.*—[Sealed 27th July, 1837.]

These improvements consist in the following modes or manners of manufacturing the aforesaid articles, in which I particularly state the various processes that I adopt, and the various materials that I use in my aforesaid manufacture: and, first, with regard to the materials from which I produce my aforesaid articles of manufacture, be it known that I use for this purpose the refuse lime liquor of the gas-works, being the bright liquor that swims on the top of the muddy impure lime, after they have been emptied out of the purifying vessels of those gas-works which purify their gas by the wet lime, or cream of lime process; which liquor is named in many of the aforesaid works blue-billy liquor. I also use for my aforesaid manufacture the refuse dry lime of those works which use the dry lime mode of purifying, being the aforesaid dry lime after it is taken out of the purifying vessels. I also use various secondary articles, which I shall name when I come to specify the processes in which they are used. From the aforesaid lime liquor I manufacture Prussian blue, prussiate of potash, and plaster of Paris; and from the aforesaid dry lime I manufacture Prussian blue and prussiate of potash. With regard to my modes or manners of operation in my aforesaid manufacture, they are as follows: as I find that the liquors which I receive from the different works, and also those procured at different times from the same works, vary very much in strength, so I find it most profitable to separate the liquors into two distinct classes, according to their strengths, and to adopt two different modes of opera-

tion with them: the mode of operation with the dry lime is also different from the other two modes with the two classes of liquors; so that altogether I have three different modes of operation, which I shall now make known in the order in which I have stated them, that is to say, the two modes of operation with the two classes of liquors, and then the mode of operation with the dry lime. But, first, I shall state my mode of classing the liquors. In the first class of liquors I place all the weak liquors, being those which require less than one pound of oil of vitriol for the saturation of an imperial gallon; and in the second class I place all the strong liquors, being those which require one pound and upwards of oil of vitriol for the saturation of an imperial gallon. My mode of testing, to which class any liquor which I may procure belongs, is the following:—I measure off an exact gallon of the liquor to be tested, and pour it into an earthen jar that will contain from three to four gallons; I then weigh off in a bottle of any convenient shape two pounds of oil of vitriol, or sulphuric acid, of the strength of 1.845; I then pour from this bottle a quantity of the acid into the liquor, and adding it gradually until the effervescence begins to grow weak, I then take a slip of litmus testing paper, and when I find that on dipping it into the liquor the paper is coloured red, I stop adding the acid; I then weigh the acid that remains, and the difference in weight is what is required to saturate a gallon of the liquor under trial: if it is less than one pound, then the liquor will belong to the first class, or the class of weak liquors; if it is one pound or more, then the liquor will belong to the second class, or the class of strong liquors.

I shall now describe my mode of operating upon the first class of liquors, being the class of weak liquors. These I receive into large wooden tanks or vats, containing from four to five thousand gallons; in these tanks or vats,

when nearly full, I put the liquor through the first or preparatory process; the liquor as I receive it from the works contains in solution hydro-sulphuret of lime, and hydrocyanate of lime, or prussiate of lime; the real quantity of these being of course in proportion to the strength of the liquor; the relative quantities being in most liquors nearly fourteen parts hydro-sulphuret of lime to one part hydrocyanate or prussiate of lime. The object of my first or preparatory process, is to convert the hydrocyanate or prussiate of lime into ferro-hydrocyanate, or ferro-prussiate of lime, to prevent its decomposition in the second or saturating process; and this I effect in the following manner: —for every one hundred gallons of the liquor, I take ten pounds of green copperas, or sulphate of iron, and five pounds of newly-slacked quick lime. I dissolve the copperas in water in one vessel, and mix the quick lime with water in another, till it is about the consistence of cream; I then add the solution of copperas to the lime, and after stirring them for a few minutes, pour them into the tank or vat of liquor to be operated upon; the whole body of the liquor must then be stirred for a quarter of an hour, and then be left for twelve hours, when it is ready for the saturating process. The saturating process I perform in the following manner:—the vessel in which I perform this operation is an air-tight cask, containing three hundred gallons; on the top of this cask I place a stone-ware receiver, containing sulphuric acid, and having a stone-ware cock fitted into it near the bottom. Below this cock is a funnel of sheet lead, which is soldered to a leaden pipe of one half-inch internal diameter, and bent in the form of the letter S. The other end of this pipe is inserted into the top of the saturating vessel, which stands on end, and through this funnel and pipe the acid is conveyed into the liquor. I also insert through the top of the saturating vessel another

tube, of three inches internal diameter, being of tin-plate. This tube rises up one foot from the top of the saturating vessel, and then bends off at a right angle, and is carried along horizontally. This tube is for the purpose of conveying away the sulphuretted hydrogen gas, which is thrown off in the saturating process; which sulphuretted hydrogen gas I make use of in a way that I shall afterwards describe.

Into the side of the saturating vessel I also insert a cock, to draw off a little of the liquor to ascertain when it is saturated. In the top of the saturating vessel, I also make a round hole of three inches diameter, into which I fit a wooden plug, moveable at pleasure. This hole is for the filling of the saturating vessel with the liquor to be saturated. In the side of the saturating vessel, close to the bottom, I make another hole of similar dimensions, into which a plug is also fitted. This hole is for the purpose of emptying the saturating vessel after the liquor is saturated. When I proceed with the saturating process, I draw off the bright liquor, free from any of the sediment from the first process vat, by means of a syphon. The saturating vessel being placed on a lower level, by this means I fill the saturating vessel three-fourths full; I then stop the syphon, put in the top plug into the saturating vessel, and open the cock of the stone-ware receiver, allowing the sulphuric acid, or oil of vitriol, to flow in a stream the size of a goose-quill. After allowing it to flow for about ten minutes, I draw off a wineglass full of the liquor from the cock in the side of the saturating vessel, for the purpose of testing it, to ascertain if it is saturated. The test I apply is the following:— I dissolve a small quantity of green copperas, or sulphate of iron, in a wineglass full of water; I then pour a small quantity of this solution into the wineglass full of liquor to be tested. If it is not saturated, the liquor immediately

assumes a black colour; but if it is saturated, it immediately assumes a light green colour. When, by this means, I find that the saturating process is complete, I immediately stop the cock through which the acid flows. I now draw the plug which is close by the bottom of the saturating vessel, when the whole of the liquor flows out, conveying along with it the sulphate of lime, which the acid has precipitated or thrown down from the liquor. This stream of saturated liquor and sulphate of lime that flows from the plug-hole, I receive upon a filter of coarse cloth in a frame five feet square, and suspended over a sunken wooden tank: the clear liquid passes through the filter, and the sulphate of lime remains upon it. When it has ceased flowing from the saturating vessel, I immediately replace the plug, and the saturating vessel is then ready for another operation. I then pour three or four pails full of water upon the mass of sulphate of lime on the filter, to drain through any liquor that remains among it. The sulphate of lime is then removed, and from it I manufacture my plaster of Paris in the following manner:—

After making a large bed of about three feet in thickness on any convenient piece of ground, I allow it to remain there for about six months, to drain thoroughly through the action of the rain; I then take it up, and after being burnt or boiled in the ordinary way of manufacturing plaster of Paris from native gypsum, it is then fit for the market.

The saturated liquor, after it passes through the aforesaid filter, is then pumped up into wooden tanks or vats, containing one thousand gallons each. When one of these is filled, I add to it a solution in water of sixty pounds green copperas, or sulphate of iron; a precipitate of a light green colour in a short time falls down from the liquor. The

clear liquor is drawn off from this, and run away; fresh water is added, is allowed to settle, and again drawn off; and this is continued till the water comes off tasteless. The precipitate is then thrown on filters, when it is brought to the consistence of a pulp or paste. This I call my coarse blue, and from it in this state I make fine Prussian blue and prussiate of potash. To make Prussian blue, I proceed in the following manner:—for every one hundred pounds of the pasty coarse blue, I take fourteen pounds of soda of commerce, or an equivalent quantity of other alkali; I dissolve it in ten gallons of water: this solution I bring to a boiling heat, and pour it upon the pulpy coarse blue; I then stir it at intervals for three hours; I then allow it to settle, then draw off the clear liquor, and throw the sediment on a filter, that what remains may drain from it. To every gallon of this liquor, I add a solution of one pound of green copperas, or sulphate of iron, which throws down a dark green precipitate; to this I add muriatic acid, or spirit of salt, till it assumes a deep blue colour; it is then washed till the water comes off tasteless, thrown upon filters, from them placed on chalk stones in a drying-house, and then dried off on iron plates exposed to the temperature of from one hundred and fifty to two hundred degrees of Fahrenheit.

In making my prussiate of potash from the pulpy coarse blue, I proceed in the following manner:—for every one hundred pounds of pulpy coarse blue, I take nine pounds of the potash of commerce, and dissolve it in two gallons of water; I then add to it the pulpy blue, and bring up the whole to a heat of one hundred and fifty degrees of Fahrenheit. I keep it at this for three hours, with frequent stirring; I then allow it to settle, draw off the clear liquor, throw the sediment upon a filter, and wash out what re-

mains with a little water. I then evaporate the whole of this clear solution till a pellicle forms upon its surface, when I draw it off to crystallize.

The sulphuretted hydrogen gas, which I described before as being carried off in a tube of three inches diameter, I make use of in the following manner:—I carry it onwards to a leaden chamber, constructed upon the ordinary plan of manufacturing sulphuric acid, or oil of vitriol. When within ten feet of the furnace of the chamber, I bend the pipe into an air-tight cask three-fourths filled with water, the pipe opening two inches below the surface of the water; the use of this is to prevent explosions of the gas when it gets mixed with air; another pipe of the same size that does not enter the water conveys the gas to the furnace, when being lighted it burns with a large blue flame, and is converted into sulphurous acid gas and watery vapour: these are conveyed by a large pipe into the chamber, when the sulphuric acid gas is converted into sulphuric acid, by the same means as when it is obtained by the burning of brimstone. My sulphuric acid thus produced, I use in my saturating process.

I shall now describe my method of operating upon the second class of liquors, being the class of strong liquors. In operating upon them, I proceed upon the principle of converting the hydro-sulphuret of lime into a sulphuret of lime, at the same time converting the hydrocyanate of lime or prussiate of lime into a ferro-hydrocyanate or ferro-prussiate, to prevent its decomposition; this I effect by the following method:—for every one hundred gallons of the liquor to be operated upon, I take six pounds of green copperas, or sulphate of iron, and dissolve it in sixteen gallons of water; to this I add two gallons of the ammoniacal liquor of the gas-works: I then allow the precipitate to settle, pour off the water, and put on fresh water; repeating

this till the water comes off tasteless; I then put the sediment among the liquor to be operated upon, then put the whole into an evaporating vessel, and evaporate it down to perfect dryness, taking care that the heat be so moderated in the last stage of the process, as not in the least degree to burn it; I then take the residual substance out of the evaporating vessel, and reduce it to a coarse powder; and from this powder I produce Prussian blue and prussiate of potash in the following manner:—to make Prussian blue, for every one hundred pounds of the coarse powder, I take fourteen pounds of the soda of commerce, or an equivalent quantity of other suitable alkali, and dissolve it in sixteen gallons of water; this I bring to a heat of one hundred and fifty degrees of Fahrenheit; I then pour it on the powder, and stir every quarter of an hour for three hours; I then allow it to settle, draw off the clear liquor, throw the sediment upon a filter, and pour over it six gallons of water, at one hundred and fifty degrees of Fahrenheit; I add the liquor that comes through the filter to that which was poured off; I then put the whole into a pan, and bring it to a boil; I now add to it a substance that will abstract a quantity of sulphur, which the soda has dissolved, and holds in solution for this purpose. I can use the black oxide of manganese, or the yellow oxide of lead, named litharge; but I prefer using, as cheaper, the red oxide of iron, obtained from the decomposition of pyrites by heat: this I reduce to powder, and wash thoroughly, to separate any sulphate of iron that might cling to it, for the quantity of liquor to be operated upon as aforesaid. I take a quantity of this oxide of iron, equal to six pounds of it, in a dry state, and put it into the boiling liquid, stirring till it be thoroughly mixed, and then boil for ten minutes, and then empty it into a settling vessel; when the liquor brightens it is drawn off, the sediment thrown upon a filter, and any that may remain

thing it is washed out with two or three gallons of water: to this clear solution I now add eight pounds of green copperas, or sulphate of iron, dissolved in water, which throws down a dark green precipitate; on this I pour muriatic acid, or spirit of salt, till it assumes a deep blue colour; it is then washed, filtered, and dried, in the same way as the Prussian blue from the first class of colours.

To make prussiate of potash from my aforesaid coarse powder, I proceed as follows:—for every one hundred pounds of the coarse powder, I take eight pounds of the potash, or nine pounds and a half of the pearlash of commerce, and dissolve it in twelve gallons of water, bring the solution to a heat of two hundred degrees of Fahrenheit, and then pour it on the coarse powder; I stir it frequently for two hours, and then add eight gallons of water at a boiling heat, stir, and then allow it to settle; I draw off the clear liquid, throw the sediment on a filter to drain, and then wash it through with six gallons of water, at two hundred degrees of Fahrenheit: the liquor passed through the filter I add to that drawn off; I put the whole into a pan, and bring it to boil; I then add eight pounds of the aforesaid oxide of iron, and boil for ten minutes; it is then drawn to separate the sediment, after which the bright liquor is returned into the evaporating pan, and boiled down till a pellicle forms on its surface, when it is drawn into the crystallizing vessel to crystallize.

I now come to describe my process with the refuse dry lime of those gas-works which use the dry lime mode of purification, being the aforesaid refuse dry lime after it is taken out of the purifiers; this I find to contain chiefly sulphuret of lime (or calcium), carbonate of lime, and cyanide of lime (or calcium); and the two former not being soluble to any great extent, while the latter is converted into hydro-

cyanate, and dissolved when it comes into contact with water: in accordance with these statements, I proceed in the following manner:—having put a quantity of the dry lime into a large wooden vat, I let in water heated to about one hundred and fifty degrees of Fahrenheit, till the lime is thoroughly soaked, and the water stands about a foot above the mass, and then it is beaten about till well broke; it is then allowed to remain, with occasional stirring, for eight hours, when it is allowed to filtrate out by a cock at the bottom of the vat; this liquor is set aside for using at once: —more water is then added to the mass, is allowed to filtrate through, and is then used for another quantity of dry lime.

To make Prussian blue from the aforesaid liquor first run off, I proceed as follows, and I bring the liquor to boil: —for every one hundred gallons, I use twenty pounds of the dry oxide of iron, allow it to boil for ten minutes, and withdraw it into a settling vessel; when settled, the liquor is drawn off to this liquor; I then add a solution of muriate of iron, as long as any precipitate is thrown down; muriatic acid, or spirit of salt, is then added, until it assumes a deep blue colour: it is washed, filtered, and dried, in the same manner as before specified.

To make prussiate of potash from the before-mentioned liquor, I dissolve a quantity of the potash or pearlash of commerce in as small a quantity of water as will dissolve it; I then add it to the liquor as long as a white precipitate is thrown down; I then allow this precipitate to settle, and draw off the clear liquor, bring it to boil, and for every pound of alkali used, I take a pound of the red oxide of iron, boil it ten minutes, then withdraw it to separate the oxide; I then return the liquor into the evaporating pan, and boil down till a pellicle forms on its surface, when it is run into the crystallizing vessels to crystallize.

Having thus described the nature of my invention, and the manner of carrying the same into effect, I would remark, that I lay no claim to the producing sulphuric acid from the sulphuretted hydrogen, evolved in what I have called the saturating process; and I have only mentioned it for the purpose of pointing out the most advantageous mode of carrying on the other processes; nor do I claim the production of prussiate of potash from Prussian blue generally; and I am aware that Prussian blue, admixed with sulphate of lime, has been proposed to be obtained from lime liquor; I do not, therefore, claim the manufacture of a product so combined, or in a state of admixture the one with the other; but what I do claim as my invention is, first, the production of the three separate products, Prussian blue, prussiate of potash, and plaster of Paris, or either of them, uncombined with other matter, from what I have called weak liquors, being the refuse lime liquors of the gas-works, as above described.

Secondly, the producing the two separate products, Prussian blue and prussiate of potash, or either of them, uncombined with other matter, from what I have called strong liquors, being the refuse lime liquors of gas-works, as above described.

And, thirdly, I claim the production of Prussian blue and prussiate of potash, or either of them, uncombined with other matter, from the refuse lime after it has been employed for the dry lime process of the gas-works, as above described.—[*Inrolled in the Inrolment Office, January*, 1837.]

To Andrew Smith, *of Princes-street, in the parish of St. Martin-in-the-Fields, Westminster, in the county of Middlesex, engineer, for certain improvements in the construction of standing rigging and stays for ships and vessels, and in the method of fitting or using it; and in the construction of chains applicable to various purposes; and in machinery or apparatus for making or manufacturing such rigging and chains.*—[Sealed 21st December, 1836.]

These improvements in standing rigging and stays for ships and vessels, and in the method of fitting or using it, consist, in the first place, in certain improvements upon the subject of my former patent, granted by his late most excellent Majesty, King William the Fourth, and dated at Westminster, 12th January, 1835, for a new standing rigging for ships and vessels, and a new method of fitting and using it. The first feature of this, my present improvement, is, splicing the end of my patent wire rope round a thimble or dead eye, and thereby better adapting it to the purposes of standing rigging.

The second feature of my present improvement, viz. the construction of chains applicable to various purposes, is a method of forming chains for rigging, for cables, and for other uses, of iron or other wire, or of strips of plate metal, wound in successive layers into links, and rendered solid and compact by means of tin or some other readily fusible metal, or alloy of metals, run in a molten state into the interstices or spaces between the combined wires or strips.

Thirdly, twisting long links of iron or other wires, or metallic rods, into forms suited for shrouds, constituting distinct links between the respective ratlings, and also for stays; and, fourthly, the machinery or apparatus employed for making or manufacturing such rigging and chains.

As respects my wire ropes for rigging, I have fully described the manner of making them in the specification of my patent above mentioned; which specification was duly inrolled in Chancery, in the Rolls Chapel Office, on or about the 12th day of July, 1835, and to which I now refer (see vol. vii. page 359, of our present Series). It will there be seen, that a series of lengths of wire were combined together, and enveloped with coatings, to prevent oxydation, the ends of the wire being inserted into conical tubes, and spread out for the purpose of securely holding them.

I now propose, as a more secure mode of fastening the ends of the wire ropes, to turn them over in the forms of loops, as shown in Plate IV., at fig. 18, and having a metallic lining *a, a, a,* which I call a long thimble. The ends of the wires are then separated into three or more distinct portions, and passed through interstices made in the other part of the wire rope at *b*, in the manner in which hempen ropes are usually spliced. These loops and thimbles may then be fitted to dead-eyes or shackles, in the ordinary way, and the wire ropes are, by these means, adapted to the purpose of shrouds and other standing rigging.

The links of the wire chains, constituting the second head of my invention, are made by winding a length of wire round a mould, shaped as a pulley, but of an elliptical form, as shown in three different views at figs. 19, 20, and 21. One of the links so formed of wire, is represented at fig. 22, and the wires being compactly brought together in the way technically called "*selvage fashion*," they are then prepared with a chemical material, as a flux, and afterwards immersed in molten metal, consisting of some of the alloys or compounds similar to hard or soft solder, which entering in between the interstices, fills up the substance of the materials forming the ring or link into a solid mass, as represented at fig. 23. I sometimes, instead of wire, use long

strips of thin plate metal cut into the form of a section taken lengthwise, of a very long parabolic spindle; the length of the strip being made equal to the circumference of the link so many times repeated as will, by the accumulated thicknesses of the plate metal lapped one over another, produce the required thickness of the link; and the breadth of the strip in the middle of its length, must be equal to a section of one side of the link or its thickness. The strip of plate metal may be wound or lapped round one of the elliptical moulds, as described, and be afterwards immersed in molten metal, for the purpose of cementing its parts altogether into a compact or solid state.

It will be perceived that thus far I have only described the method of making single links, I will now proceed to show the manner in which I construct chains by connecting these links together. This is done by threading or winding a similar link of wire or plate metal through two of the previously-formed links, which are by any convenient means to be placed as shown in fig. 24, at A, B, partially inserted into recesses or notches cut in the mould-block; one of which mould-blocks is represented in two positions at figs. 25, and 26. In these two last-mentioned figures, the situations of the two previously-formed links A, and B, which are to be connected together by threading or winding a third link through them, are shown by dots.

Fig. 27, represents the two links so connected together by the link C, formed by a length of wire passed many times round the mould-block D, one side of the mould-block being removed in this last-mentioned figure, for the purpose of exhibiting the now-formed link more clearly. When the connecting links have been so made, the wires are to be cemented together by solder, as before described, and a chain is produced, as fig. 28.

Links of any required length, suited for shrouds and stays, may in the above way be formed of wire wound upon a suitable mould, or of rods of metal so wound, and the separate links may be connected together into a chain, by threading or winding wires or rods through them as described; and when the chain has been so formed, the sides of the links may be twisted by any convenient mechanical means, and adapted to the purpose of shrouds or stays, as shown at figs. 29, and 30.

The machinery or apparatus to be employed for making or manufacturing the above-described chains, constituting the fourth head of my invention, is shown in the several figures of the drawings from fig. 19, to 21, and from fig. 24, to 27, inclusive. The moulding-block round which the wire is to be wound for forming the link, is, as before said, of an elliptical figure, having a semi-cylindrical groove round its periphery as a pulley. The block is constructed of two parts, separating in the middle in the perpendicular line as shown in fig. 19, and the parts separated are shown in two positions at figs. 20, and 21. The two parts of the moulding-block being put together as at fig. 19, it is mounted upon an axle or spindle passed through the aperture in its centre. The end of the wire intended to be wound upon the block is then inserted into a hole in the periphery of the block for the purpose of confining it; and the block being turned upon its axle, the wire which is drawn from a reel, and held with a slight degree of tension, winds round the moulding-block, until a sufficient quantity has accumulated to constitute the substance of the link; the two parts of the block are then separated, and the link is removed therefrom.

The apparatus for connecting the links together for forming chains, as shown at figs. 24, 25, 26, and 27, consists of a moulding-block, constructed as before described;

but in this case recesses or notches are made in the block, as shown in fig. 26, for the previously-formed links to be inserted into. When these links have been properly fixed, the wire is passed round the block and through the links as at fig. 27, by means of a shuttle worked by the hand, or by any suitable machinery whereby the new link is made, which connects the two former; and this being repeated, any number of links may be so formed and connected as to constitute a chain of any required length.—[*Inrolled in the Rolls Chapel Office, June,* 1837.]

Specification drawn by Messrs. Newton and Berry.

To JAMES STEWART, *of George-street, Euston-square, in the county of Middlesex, pianoforte-maker, for his invention of improvements on the mechanism of horizontal, grand, and square pianofortes.*—[Sealed 15th January, 1835.]

THE Patentee describes his invention in the following manner:—Fig. 12, Plate V., represents a section of the working parts of a pianoforte; *a*, is the key resting upon a centre-piece *b*; *c*, is a small wooden block, fixed upon the key, and having a small pin covered with cloth passed through it, around which pin a wire spring *d*, is passed; one end of this spring bears upon the key *a*, and the other end acts upon the lower end of the hammer lever *e*, so that the reverse end of the hammer lever may be pressed upwards, and kept in a notch made in the centre block *f*, of the hammer *g*. The escapement is represented at *h*, and is formed of a piece of wire, having one end fixed on the key, and the other end bent down in a semicircular form, and having a wooden button, covered with cloth, screwed into the end. This escapement is more clearly

shown in the detached figure 13. As the wooden button is screwed on to the wire, it may be easily lowered or raised, by being turned by hand, and by this means regulated to the proper distance from the end of the hammer-lever, which will come into contact with it when the key is depressed, and causes the hammer-lever to escape from the notch of the hammer-block, just before the head of the hammer strikes the strings; *i*, is the check, which is for the purpose of preventing the hammer when it has once struck the strings from repeating the motion without the key is depressed.

Fig. 14, represents the second part of the invention, as described by the Patentee, and is a section of the working parts of the pianoforte, taken in a similar manner to fig. 12. This part of the improvement consists in applying what is commonly denominated a grasshopper-lever, without the use of the under hammer-lever, which is generally employed in the construction of square pianofortes. As all the letters of reference refer to corresponding parts in the figures, as well as in that before described, it will not be necessary to describe this figure any further, than pointing out the difference between these improvements and the ordinary mode of constructing this sort of piano. The novel and essential difference is this, instead of letting the hammer-lever *e*, always rest on the regulating button of the escapement *h*, which is the old method of constructing pianofortes, the lever, according to the present improvements rests upon the notch of the centre-block *f*, of the hammer; and the regulating button is placed at such a distance from the hammer-lever, as only to come into contact with it when the key is in its downward motion, and thus cause the hammer-lever to escape from the notch which is made in the centre-block, just before the head of the hammer strikes the strings. The lower projecting

part of the hammer-lever is made for the purpose of allowing the spring *d*, to act upon the lever, and thus keep it in its place, in the notch of the centre-block of the hammer.

In conclusion, the Patentee says, that "having now described the improvements which constitute my invention, I would wish it to be understood that I lay no claim to the parts separately, but confine my claim of invention, first, to the mode or method of applying the escapement on the key; and, secondly, the mode of applying the hammer-lever, as shown in fig. 13, as above described."—[*Inrolled in the Inrolment Office, July*, 1835.]

To Thomas Simmons Mackintosh, *of Coleman-street, in the City of London, engineer, and* William Angus Robertson, *of Islington, in the county of Middlesex, gentleman, for their invention of certain improvements in steam-engines.*—[Sealed 28th September, 1837.]

These improvements, described in the specification, consist, firstly, a mode of condensing steam by contact with cooling surfaces, instead of by injection, as generally employed, and consist, in the first place, in proportioning the cooling to the heating surfaces, that one side of the piston shall be counterbalanced by the other; that is to say, the cooling surface shall be equal to absorb the difference of temperature between the discharged steam and cold water; secondly, in the means to carry this object into effect. In the first apparatus described, the boiler is situated at such a distance below the condenser, as will allow of the column of water counterbalancing the pressure of the steam, which after leaving the cylinder is conducted to the condenser, where it is cooled by contact with the colder surfaces, and returns again to the boiler in the state of water. The

second apparatus described, is applicable to those situations where a sufficient altitude for the condensation or feed cannot be obtained, and consists in the employment of what the Patentee denominates a water returner: in this apparatus, the steam having been condensed, remains in the condenser until the boiler requires feeding, when the float arriving in contact with a stud attached to a cock, the steam is allowed to flow on to the surface of the feed water, which then having the same pressure above as below, it falls by its own gravity into the boiler. This apparatus is shown adapted to several descriptions of engines; in marine engines the cooling fluid entering the condenser through apertures in the vessel. The next head of the invention describes a peculiar construction of condenser for carrying the above object into effect, and consists of a number of compartments, alternately steam and water chambers; the divisions of these compartments being embossed, and some of these compartments being reserved for the transmission of air, which becoming heated in its passage is conducted to the furnace, to support the combustion of fuel in the furnace. The Patentee here remarks, that with this apparatus an air-pump of very small dimensions will be necessary. The second distinct head of this specification, describes an improvement on Hancock's boiler, and consists in forming the divisions of the compartments of embossed plates, as in the condenser above described. The third head described in the specification, is a mode of more perfectly preventing the admission of air to the working parts of steam-engines, and consists in the employment of a cloth packing to the piston, piston-rod, and such other parts of the engine as require packing: this part of the invention is carried into effect in the following manner:—The packing of the piston, piston-rod, and other parts of the engine requiring such process, consists of two

rings of India-rubber cloth, and two metallic spring rings, which are used for the purpose of pressing the cloth against the internal surfaces of the cylinder, or other surfaces to be packed.

The claims under this patent are, first, the proportioning of the cooling to the heating surface, as above described; second, the peculiar construction of the water returner; third, the mode of supplying the condenser in marine engines by apertures in the vessel; fourth, the peculiar construction of condenser described; fifth, the improvement on Hancock's boiler; and lastly, the mode of packing generally, as above stated.— [*Inrolled in the Inrolment Office, March,* 1838.]

To CLINTON GRAY GILROY, *of Argyle-street, New-road, St. Pancras, in the county of Middlesex, engineer, for his invention of certain improvements in machinery, for weaving plain and figured fabrics.*—[Sealed 25th February, 1836.]

THE improvements specified under the title of this patent, refer to part of the loom, which is technically called the taking-up motion, and applies to looms for weaving both plain and figured fabrics. Fig. 15, Plate V., represents a longitudinal section of some of the principal working parts of an ordinary power loom, with the improvements attached thereto; *a*, *a*, being the framework; *b*, the warp-roller; *c*, the work-roller, or taking-up roller, with the improved motion attached thereto; *d*, is the slay, with the reed, &c., the frame of which works on axes or pivots, and is forced forward by springs; and according to the strength of these springs the weft or shoot will be beaten up open or close. These springs may be adjusted, as regards their

pressure, by slides, which are capable of being moved nearer to or further from the reed, by means of set screws; *e*, is a bent lever, having its fulcrum on the axis of the work or cloth roller, having a pall or click *f*, at its end; which pall or click takes into a ratchet wheel *h*, that turns upon a pin that is fixed in the framing: upon the axle of this ratchet wheel is fixed a small-toothed pinion *i*, which takes into a toothed wheel *j*, on the axis of the work or cloth roller *e*; *k*, is a lever having its axis upon a centre *l*, which is attached to the sword which carries the reed. The upper end of this lever is constantly kept in contact with the reed by means of a spring, and the lower end is turned up or bent, so as to come into contact with the bent lever *e*, when the loom is at work. The Patentee here says, having explained the nature of the various parts constituting his invention, "I will now proceed to describe the manner of carrying the same into operation; first, however, remarking that only those parts of the ordinary loom are shown, which are necessary for the perfect explanation of these improvements. Fig. 15, represents the position of all the parts as they would appear immediately that the weft has been beaten up by the reed. On the sword *m*, of the slay is a stud or projecting part *n*, against which the bent lever *e*, rests, and as the reed falls back the stud *n*, lifts the bent lever, and thereby causes the click, pall, or driver *f*, to force forward the teeth of the ratchet wheel *h*, which is prevented from returning to its original position by a pall or click *o*, which is attached to the side-framing of the loom." The Patentee here observes, that "the reed is forced back by the weft in the act of beating up, as the weft acts on the lever *k*, and makes its lower end to strike against the bent lever *e*, and by this means put the cloth roller in motion, and thus wind on the fabric as it is woven; but if the reed beats up without the

shuttle, or should the shuttle contain no weft, the reed would not in that case be forced back, as then there would not be any addition to the weft of the crossing of the shuttle which has been previously beaten up, the reed would not, therefore, be forced back by the subsequent working of the loom, and consequently the lever *k*, would not strike the bent lever *e*, and therefore the taking-up motion would not be set in motion; and a similar effect would also take place if the weft thread should by any chance become broken, as the shuttle would then be thrown from side to side, without leaving any weft-thread to act up the reed and the lever *k*." The Patentee says in conclusion, "Having thus described the nature of my invention, and the manner in which the same is to be performed, I would here remark, that I am perfectly aware that all the parts of a loom, with the exception of the bent lever *e*, with the click or driver *f*, attached thereto, do not possess any feature of novelty, but are well known, and in use; I do not, therefore, claim them as any part of the invention secured to me by the present Letters Patent, nor do I claim the regulating the degree of closeness to which the weft or shoot is to be beaten up by the working of the reed in general, as many other, although entirely different, methods have been used and actuated by the working of the loom for similar purposes. But what I claim, and confine my claim of invention to, is the application of the bent lever *e*, with the click or driver attached thereto, by means of which the taking-up motion is actuated when there is any weft or shoot thrown in, and such lever not causing the taking-up motion to continue when there is no weft-thread thrown in by the shuttle, whether the cause may arise from the shuttle flying out, or the weft-thread breaking, or being expended, as above described."—[*Inrolled in the Inrolment Office, August*, 1836.]

To Pieux Antonin de Rigel, *of Vienna, but now residing at Beaufort-buildings, Strand, in the county of Middlesex, engineer, for his invention of improvements in steam-engines.*—[Sealed 14th October, 1837.]

The invention specified under this patent, consists in arranging the two engines of a steam vessel in such a manner that they may act separately upon their respective paddle-wheels, so that one engine may be stopped while the other is working. The method employed by the Patentee for effecting this object is, by placing a cock upon the steam-pipe, which is used for conveying steam to the cylinders of both the engines, so that the steam may be shut off from one cylinder when it is acting upon the piston of the other. The object of this is, that when the vessel is being put on a different course, that paddle wheel which would otherwise impede the course of the vessel may be stopped, and that one alone should be kept in motion, which will assist in turning her to the required point.—[*Inrolled in the Inrolment Office, April,* 1838.]

To Jonathan Dickson, *of Charlotte-street, Blackfriars-road, in the county of Surrey, engineer, for his invention of certain improvements in steam-engines, and in generating steam.*—[Sealed 30th September, 1837.]

These improvements consist, first, in the employment of three cylinders, to be worked by steam, of different degrees of temperature, which, after leaving one cylinder, is conveyed to a boiler of lower-pressure steam, from thence to the second cylinder; after which it passes to a third boiler, and from thence to the low-pressure cylinder, when it is

condensed in the usual manner. Secondly, in so arranging three boilers, side by side, that the current of combustion being divided, one boiler shall have a greater heating surface than another, for the purpose of generating steam, to be worked at different degrees of temperature, as above. Thirdly, in working the feed pump from the end of the piston rod, for the purpose of dispensing with the ordinary parallel guides; and, lastly, in placing bars of metal in the bottom of the boiler, in order to prevent the gas which may be generated by the action of the fire from raising up the water, and thus creating a space for the generation of more gas: for the Patentee states, that the water being divided into an irregular surface at the bottom, it would be constantly retained in contact with the bottom of the boiler, and thus prevent the bad effects alluded to.—[*Inrolled in the Inrolment Office, March,* 1838.]

To Archibald Richard Francis Rosser, *of New Boswell-court, in the county of Middlesex, Esq., for an invention of improvements in preparing manure, and in the cultivation of land, being a communication from a foreigner residing abroad.*—[Sealed 3d August, 1837.]

This invention relates to the preparation, or rather decomposition, of certain substances to be used as manure in the cultivation of land, which have been hitherto considered useless as for the purposes of manure, owing to the difficulty of reducing them to a state of decomposition which would be fit for the above-mentioned uses. The substances referred to are such, for instance, as reeds, rushes, broom, heather, furze, &c.; and also many other vegetables and weeds, which it has been considered dangerous to use as a

manure, owing to the difficulty of destroying their vegetating powers, conch grass for instance, but which are, however, by this process, entirely destroyed.

The method specified for carrying this object into effect, is a very rapid fermentation, which is performed in the following manner, and by the employment of the hereinafter-mentioned materials and ingredients:—One of the materials employed for the rapid decomposition of the vegetable substances before mentioned, is what the inventor calls *eau à saturer*, or saturating water, which is prepared in the following manner:—A water-tight tank is constructed, of about twelve feet in length, by about six feet in breadth, and six feet in depth; this tank is filled to about one-half of its depth with water, and then a quantity of vegetable substances are thrown in; those of an unctuous or mucilaginous description answering the purpose best; about ten pounds of unslacked lime and five ounces of sal ammoniac is then added, and the tank is then filled to about three-fourths of its depth with the nearest earth that can be obtained, and then is filled up with kitchen water, dead animals, spoiled provision, and filth from the dwelling-house; the whole of this is to be stirred well together; and if any very strong and unpleasant odour should arise, or insects be formed, by the decomposition of the various substances, then a small quantity more of unslacked lime may be added from time to time.

The next composition of materials employed for the decomposition of the before-mentioned substances is, what the inventor calls a *lessive*, and consists of the following materials, and prepared in the following manner:—A smaller water-tight tank must be prepared, and about two hundred or two hundred and fifty pounds of animal excrement thrown in, about fifty pounds of chimney soot, about sixty pounds of unslacked lime, ten pounds of sea salt, and about

five ounces of refined saltpetre, to which must be added a quantity of the saturating water above described; or, if that is not used, a quantity of the most impure water that can be obtained, the impurities arising from the decomposition of animal and vegetable substances; about four hundred pounds of gypsum must then be added in small quantities, and in a state of powder, care being taken that the whole of the ingredients are kept stirring during the operation of adding the gypsum, lest the materials should cake together.

The Patentee here observes, that he only mentions these substances as being those that are preferable to be used, and which the inventor has found to answer best; but that he does not mean to confine himself to the use of these only, as some notice must be taken of those substances which circumstances and economy may point out; for instance, two hundred pounds of river or sea mud may be used instead of the fecul substances or animal excrements and urine, and road scrapings, or mud collected from roads, may be used instead of the powdered gypsum; also, coarse saltpetre may be employed instead of the refined, and many other changes may be made, as economy and the experience of the farmer will point out.

The lessive thus prepared, the Patentee informs us, will convert *one* thousand pounds of straw, or *two* thousand pounds of furze, broom, heather, or other woody vegetables, into *four* thousand pounds of manure, but by what means he intends to *create* matter he does not undertake to enlighten us. He next proceeds to describe the manner of using the "lessive" in the operation of decomposing the vegetable materials above mentioned. The ground on which the operation is to be performed, must be previously prepared by beating, paving, or otherwise consolidating it, so as to render it impervious to water, and allow the liquids

employed in the present process, to drain off into a suitable tank, which is made at a convenient distance from the spot where the stack or heap is made. If straw is employed for making the manure, it may be used whole; but if furze, heather, broom, or such other vegetables are employed, it would be advisable to cut them up into small lengths of about six or eight inches, in order to make them lay close. These substances must be trodden or beaten down, or otherwise consolidated; and between every foot in depth of these vegetable materials, should be poured or drenched a quantity of the "lessive," care being taken that it should be well stirred before it is used. It should be here observed, that the vegetable materials should be steeped in the lessive previously to their being made into a stack or heap. This heap may be very conveniently raised to the height of seven feet; and when it is raised to the required height, it should be beaten and consolidated both at the side and the top, and the top should be covered with the sediment that may remain in the tank which contains the lessive; and the whole must then be covered over with planks or branches. The drainings which remain of this operation, may be used over again, either for drenching, as will be hereafter described, or for subsequent makings. The stack or heap thus prepared, must be allowed to remain for about forty-eight hours, when it will be found to have acquired the temperature of about twenty degrees of Reaumur's thermometer. Holes are then to be made with a fork in the top of the heap to about the depth of three feet, and the heap must be drenched again with the lessive; and the top of the heap, consisting of the sediment of the lessive, should be turned over, and the whole allowed to remain for about eight or nine days longer, when the material will be found to have acquired a temperature of about fifty or sixty of Reaumur's thermometer. The drenching operation

should then be again resorted to, care being taken that the lessive is well stirred up. The stack should be allowed to remain for fifteen days, when it will be found fit for manuring land.

If straw is used for making the manure, the fermentation should be stopped when it arrives at the temperature of sixty of Reaumur; but if the other materials, such as broom, furze, heather, &c. are employed, the fermentation may be carried on until it arrives at about seventy-five of Reaumur. When it may be desirable to use the manure, the fermentation may be stopped either by drenching the heap or opening it.—[*Inrolled in the Inrolment Office, February*, 1838.]

To Nathaniel Partridge, *of Elm-Cottage, near Stroud, in the county of Gloucester, gentleman, for his invention of a certain improvement or certain improvements in mixing and preparing oil paints, whereby a saving of ingredients commonly used will be effected.*—[Sealed 8th December, 1836.]

This invention of a certain improvement or certain improvements in mixing and preparing oil paints, whereby a saving of ingredients commonly used will be effected, consists in the application and use of solutions of lime in water, in the mixing and preparing of oil paints, for the purpose of thickening or preparing the oils used in the same, and forming a better vehicle for the various pigments or paints, and at the same time producing economy in the various ingredients commonly used in the mixing and preparing such paints, (that is to say) instead of using oil only in the customary manner as a vehicle for the various pigments or paints, I first saturate rain, soft, or

distilled water with lime, and when in a pure state of solution, that is, after that portion of lime which the water will not take up has subsided, and the water remains clear, it will be fit for use.

For preparing paints for the useful arts, I first mix the said lime water with oil in about equal parts or proportions, by placing the same in a proper vessel, and agitating them till they are united or commixed, in which state the combined oil and lime water will resemble thick cream, in consistency. To about two parts of this composition of lime water and oil, I add about four parts of ground white lead, by mixing and preparing them in the usual manner. Should the paint made with this proportion of the composition be found too thick, it may be reduced or thinned by adding small portions of oil, when spirit of turpentine is not mixed therewith, as in paint used for out-door work. But when turpentine is used as for in-door work, the paint may be thinned or reduced with turpentine, only without the addition of any further quantity of oil.

For what is called by the painters flatting the works, or for the last coat put on, I mix about four or five parts of the composition of oil and lime water, with about eight parts of spirits of turpentine, and add thereto as much ground white lead as the workmen may think necessary, in order to make the paint for the last or flatting coat of the proper consistency.

I may here remark, that this flatting coat will not only be put on with less trouble, but will also be found more perfect and durable than when turpentine alone is used. Should the workman wish to lay on a thicker coat of paint, he may add more white lead. For wall-painting, the walls should be oiled over before the paint is put on. It may be observed, generally, that in all cases where turpentine or dryers are used with this composition of lime water and

...em is necessary than when oil
... ..ugar of lead be used as a dryer,
... .e lime water before being mixed
... ..a state of pure solution, it will be
....the colours.

... ...ance that Prussian blue, and some of
... ...earths, such as ochres, umbers, or any
... ...may be found not to grind well in the
... ...ught to be first ground in equal parts of raw
... ...inseed oil, or boiled linseed oil only, as may be
... ...o about the thickness of white lead, as usually
... and then to be mixed up for painting with the
.... And further, that I have found the following
... ...convenient manner of preparing the solution of
... water: that is to say, to about twenty gallons of cold
...t water (or if distilled the better), apply three or four
...unds of fresh burnt lime, put them into a cask, stir it
...ell about, and let it stand about twenty-four hours, or
...ntil the water is quite clear, when it may be drawn off as
...anted: it should be stirred up every six or seven days,
...hat the water may be kept fully impregnated with the
lime: and that a convenient mode of mixing the lime water
with the oil, is by placing the proper proportion in an open
vessel, as a tub or bucket, and whisking or beating them
well together: or place the same in a bottle or jar, and
shake them together until completely blended; and further,
I would remark, that the mixture of lime water and oil
should always be well shaken before mixed with the pigments: the lime water should be kept from the air, and
as cool as possible.

For preparing my improved paints for the fine arts, the
colour should be ground in such proportions of oil and
lime water, as may be found requisite, as the exact proportions cannot be stated, as they vary according to the nature

and quality of the materials used; but it is desirable to incorporate as much lime water as possible, in order to render the paints crisp, or short, to the touch, and transparent. When sugar of lead is used as a dryer, I dissolve it in the lime water, which I consider an improvement.

For preparing a composition, or what is called by artists "maguelph," for the purpose of thinning the paints or colours on the pallet, I mix the lime water and oil together, and then add a little mastic varnish; the more lime water which can be incorporated, the thicker and crisper, or shorter, will be the composition.

Having now fully, and particularly, described the nature of my said improvements, and the manner of carrying the same into effect, I wish it to be understood that what I claim as my invention, and secured to me by the above in part recited Letters Patent, is the application and use of solutions of lime in water, or a composition of lime water and oil, in the mixing and preparing of oil paints for the useful and fine arts severally, such invention being new, and never before used within these kingdoms, to my knowledge or belief.—[*Inrolled in the Rolls Chapel Office, June,* 1837.]

Specification drawn by Messrs. Newton and Berry.

SCIENTIFIC NOTICES.

REPORT OF TRANSACTIONS OF THE INSTITUTION OF CIVIL ENGINEERS.

(Continued from vol. xii. p. 55.)

May 23, 1837.

The PRESIDENT in the Chair.

The paper by Mr. G. H. Palmer, commenced at the last meeting, having been concluded, a discussion took place on the duties of

engines. The question was asked, whether the water raised had been actually measured, and whether the calculations were not made from the known contents of the working barrel. It was the opinion of several present that the duties had always been ascertained in the latter manner. An engine in which the Cornish system is adopted, near London, has a duty of fifty million, and the Cornish system of clothing was considered as effecting a very considerable saving in fuel.

"Account of some Blasting Operations through the White Limestone on the Antrim Coast Road, in the north of Ireland; by William Bald, Civil Engineer, M.R.I.A.; F.R.S.E."

In the commencement of the paper, the nature of the Antrim Coast and of the white limestone, and the method of blasting, are briefly described. This limestone is similar to the chalk of England in the flints which it contains, but is exceedingly indurated. From the results of the blasting of several large masses of rock, it appears that *one* ounce of powder will rend 14·12 cubic feet of this limestone when in blocks; whereas the same quantity of powder was required for 11·75 cubic feet of loose whinstone blocks. The specific gravity of the white limestone is very nearly 2·760, and of whinstone or basalt about 3·200. The induration of white limestone may be estimated from the fact, that two men will bore *one* foot deeper in half an hour, the diameter of the augers or jumpers being from $1\frac{5}{8}$ to 2 inches.

A table is given exhibiting the diameter of the auger or jumper used, and the number of inches of gunpowder put in—*one* pound of gunpowder occupies *thirty* cubic inches. The force of the explosion of gunpowder is assumed to be as the cube of the line of least resistance; if the *one* ounce of gunpowder will open a distance of 1 foot of rock, 2 feet would require 8 oz., and 10 feet 1000 oz. There will be some difficulty in ascertaining the line of least resistance in stratified rocks, since the rock may be fissured, or some bed or opening may lie near to the line bored; but the hypogene rocks, as granite and sienite, lying in compact unstratified masses, present no such difficulty.

The paper is accompanied by drawings and sections, shewing the mode pursued in blasting down high cliffs, by boring at the toe of the rock; the peculiar characters of the veins commonly called scall veins, from their stong resemblance to the sutures of the scull, which traverse the blocks of white limestone; and concludes by expressing the importance of collecting accounts of the quantity of gunpowder consumed per cubic yard in blasting the various kinds of granite, sandstone, &c.; also the diameter of the augers or jumpers; the depths bored, and the quantity of gunpowder the most effective.

May 30, 1837.

The President in the Chair.

"On the Results obtained by Mr. G. H. Palmer, respecting the Maximum Duty of a given Quantity of Atmospheric Steam; by Thomas Webster, M.A.; Sec. Inst. C.E."

The object of this paper was to show that the result obtained by Mr. Palmer, in his paper on steam, read at the two previous meetings of the Institution, coincides very accurately with the authenticated accounts of the best Watt engines. In the calculation made by Mr. Palmer, no account is taken of the heat rescued by employing over again the hot water. This, considering the relative qualities of latent and sensible caloric in steam, may be taken at one-sixth; and being taken into the account, we may consider that on the principles laid down by Mr. Palmer, the duty done by a Watt engine ought to be about thirty-two millions.

The next question is, what amount of saving is to be attributed to the system of clothing adopted in the Cornish engines? This, it is stated, may change the data entirely; the quantity of water evaporated may be very different; the quantity of heat saved and worked over again incalculable: at present then we cannot apply principles of theoretical calculation in this case.

"Further Observations on Blasting the White Limestone of Antrim Coast; by William Bald, Civil Engineer, F.R.I.A."

These further observations are directed more especially to the

principle assumed by Mr. Bald in his previous communication, that the force of the explosion of gunpowder is as the cube of the length of the line of least resistance. This is the law which Vauban and Belidor have been led to assume as the result of their investigations, and Mr. Bald proceeds to show that his experiments confirm it. It appears from the experiments there detailed, that 1·9 oz. was required for the smaller blocks, and 2 oz. for the larger, per cubic yard. Knowing then the quantity of gunpowder used, and the solid contents of the blocks, we have, extracting the cubic root of the cubical contents, their respective masses in a cubical form. Taking then the length of the line of least resistance in each of these cubes to be equal to the distance from the centre to the nearest point on the surface, we know from the preceding calculation the lengths of these lines, and it appears that these experiments confirm the law of the explosive power of gunpowder, being as the cube of the line of least resistance.

The paper concludes with remarks on the purposes for which this limestone is adapted, and on the ravages to which all calcareous rocks are subject from the Pholas Dactylus, and is illustrated by drawings of the forms, fissure of the limestone, and of the beautifully radiated and fluted shell of the Pholas. From the curves traced by nature in this shell, the engineer may learn the best shape to be given to the slopes of breakwaters and harbours exposed to the run of the ocean.

"On Warming and Ventilating; by James Horne, F.R.S.; A. Inst. C.E."

In this paper the author describes a method of warming and ventilating, on the principle of spontaneous ventilation, by means of an iron stove, care being taken that the quality of the air is not affected by the iron plates exceeding a certain temperature; and mentions a successful attempt to warm and ventilate a chapel on the same plan.

Mr. Horne gives also an account of a method which he had adopted to ventilate an extensive drift or level, by forcing in air.

The machine, a drawing of which, with all the details and dimensions, is annexed, consists of an upper cylinder inverted, and working in a lower cylinder nearly full of water. An attempt was at first made to ventilate by drawing out the foul air; this, however, did not succeed. The level is 7 feet high and 4 feet 6 inches wide, and driven a mile before a rise into an upper level; the rise was then put up 400 feet in height; both level and rise were ventilated successfully by this apparatus. The diameter of the ventilating pipe was 5 inches, its length a mile. This showed most satisfactorily that ventilation could be effected by forcing in air through a great length of pipe.

Some conversation took place on the power expended in producing this ventilation, and on the friction of air forced through pipes; and reference was made to several cases, which seemed to show that air could not be forced with effect through a great length of pipe, as for the purpose of blowing blast furnaces, whereas some experiments seemed to show that air could be forced through small pipes of 50, 100, or 150, in length, with the same velocity under a given pressure.

Mr. G. H. Palmer stated, that if 100 cubic feet of air could be forced through a small hole under a pressure of *one* inch of water in a given time, only 25 cubic feet would be delivered under the same pressure through a pipe 1000 feet in length in the same time.

Mr. Hawkins stated that in the old Thames Tunnel a two-inch pipe had been found quite insufficient for ventilation at a distance of 400 feet, but that a three-inch from the same bellows, and under the same pressure, had been quite sufficient. In the former case it was suggested that the friction of the pipe was nearly the same as the pressure in the bellows, so that the air was simply condensed.

Several other instances and experiments were quoted, and it appears that we must often consider whether the condensation has had time to take effect. The air may be condensed rapidly

and none forced out; but if the operation takes place slowly, the condensation will have time to take effect.

June 6, 1837.

The PRESIDENT in the Chair.

The subject of forcing air through pipes and of ventilation being resumed, Mr. Cottam stated a case in which a circular blowing machine, having a straight pipe 10 feet in length and 6 inches in diameter, was sufficient to supply three furnaces, but that a single elbow rendered it incapable of supplying one.

Mr. Oldham, of the Bank of England, stated that in all the attempts which he had made to effect any purpose, he always endeavoured to imitate nature. Now nature supplies a large quantity of air slowly heated. He had consequently established a stove with a very large heating surface, and a pump capable of delivering fifty cubic feet per stroke. To get rid of the foul air, he made large openings in the roof, and took care that there should be an abundant supply of air properly heated. The air is brought in at a temperature of 180° F.; thus there is a rapid change of air, and a summer heat is obtained without any sense of oppression. The success which had attended this system during two frightful seasons of typhus and cholera in Dublin, would be attested by many medical men; in the middle of winter he kept the doors and windows open, and threw in abundance of warm air.

"On the Methods of Illuminating Lighthouses, and on the Reciprocating Light; by Captain Smith, of the Madras Engineers, F.R.S.; A. Inst. C.E."

In this paper Captain Smith details the two different systems of fixed and revolving lights which are generally adopted, and the objections to which each is liable. In the fixed light the effect produced is precisely proportioned to the means employed, and none of the light is lost, since none of the reflectors are pointed inland; but in a revolving light, provided the revolution

continues complete, part of the light is expended to no purpose. The revolving light is, however, necessary in many cases, since it is only by a series of flashes and eclipses succeeding in a determined order, that the particular lights on a thickly-studded coast can be distinguished from each other.

As a means of obviating the objections to which each is liable, Captain Smith proposes, in places where lighthouses are not numerous, to stop the revolution of the apparatus after a certain portion of the circumference has been traversed, and then to reverse the motion so as to cause the light to reciprocate. The action of the reflectors is thus confined to the sea-side only. By this means a light may be obtained at five-eighths of the expense usually incurred.

The paper is accompanied by a diagram descriptive of the mechanical contrivance for obtaining this alternating motion.

June 13, 1837.

The President in the Chair.

Mr. Oldham resumed the account of his system of warming and ventilating, and exhibited a model of his stove for heating the air. He was convinced that the expedient of forcing the air by mechanical means must be resorted to. He had raised the temperature of a room 24° F. in one hour; by spontaneous ventilation he could never obtain a temperature of more than 100° F., but by pumping in the warm air he readily obtained a temperature of 150° F., or 180° F.

Mr. Horne called the attention of the Institution to a lamp which he thought would be peculiarly applicable to lighthouses, or wherever an intense light is required. The usual burners are an inch in diameter; now he had succeeded in producing a clear white light by a burner of half an inch in diameter. The excellence of the light is due to the complete combustion obtained, by making the area of the external equal to the area of the internal apertures. The air thus passes directly to the burner; there is a perfect uniformity of draught, the rapidity of which may be

regulated by the height at which the burner is above the bottom of the glass, or chimney. The draught of air being thus supplied with perfect equality to both sides of the wick, a flat and steady flame of two inches in height is obtained, and the force of the draught is sufficient to prevent the flame from touching the edge of the burner, so that the edge is always clean and fit for use.

"A Series of Experiments on the Elastic Weight and Strength of Cast Iron Beams; by Francis Bramah, M. Inst. C.E."

This very extensive series of experiments had been undertaken several years ago, with the view of verifying the truth of the theory of Bernouilli, Young, and Tredgold, with respect to the equality of the forces of extension and compression in cast iron within the elastic limit. The experiments are accompanied with a paper fully explaining the method in which they were conducted, and with a drawing of a proving machine.

"A Practical Method of forming the Stones of an Elliptic Arch; by William Bald, Civil Engineer, F.R.S.E.; M.R.I.A."

In presenting this paper to the Institution, the author has no object in view but to leave a record of the proceedings of an operation successfully carried into execution more than seventeen years ago. This consists in the application of the well-known property of the elliptic, "that the lines from the foci make equal angles with the tangent at any point." The moulds are thus traced out by drawing a few straight lines.

This plan was adopted in the construction of a bridge over the Owen-More river, in the west of Ireland; and a model of the two courses of the cutwaters of this bridge was presented to the Institution. In these courses the stones are cut so as to break joint with each other, and the blocks are connected together into one course after the manner so ingeniously devised in the construction of the Edystone.

List of Patents

Granted by the French Government from the 1st of July to the 30th of September, 1837.

(Continued from page 58.)

To Louvrier Gaspard, of Paris, for a new evaporating pan on the vacuum system.

— Joseph Tenaud, of Montoir, for a machine for producing a new kind of fuel.

— Curtis Burrit Raymond, of New York, for an apparatus to be used in cases of prolapsus uteri.

— Moses Poole, of London, for the composition of a new and economical fuel.

— Charles Christoffe, of Paris, for a new metallic web, applicable to jewellery.

— Klemm and Torasse, of Paris, for a clock set in motion by water.

— Pierre Charles Leclerc, of Paris, for a new kind of musical instrument.

— Desliers and Martel, of Lille, for a blue paste for staining paper.

— Louis Henri Joseph Truffaut, of Paris, for improvements in the bobbin-net frame.

— Roussel and Requillant, of Turcoing, for improvements in carpets.

— Marion de la Brillantais, of Paris, for a lamp for burning essential oils.

— Achille Moreaux, of Limagne, for a machine for cutting slates.

— Engelmann, father and son, of Mulhouse, for a new process of lithographic printing.

— Jean Charles Colpin, of Passy, for the decomposition of caoutchouc, and its application on leather and other goods.

— Louis Miathe, of Paris, for a method of rendering wines sparkling by the introduction of carbonic acid.

To Achille Monvoisin, of Paris, for an improved piano.
— Loyer and Darbois, of Metz, for an apparatus for economising fuel, applicable to steam and other engines.
— Claude Julien Bresson, of Paris, for improvements in twisting machines.
— Bernard Dutastre, of Vaugirard, near Paris, for a mechanical printing-press.
— Marchand and Carbon, of Rheims, for a thrashing machine.
— Joseph Maximilien Vayson, for an improved machine for combing wool.
— Beaudoin Kamenne, of Sedan, for a machine for manufacturing shoe nails.
— Antoine Eugene Monfray, of Monville, for an improved loom.
— Der-Maurel, of Lyons, for a means of preparing bitumen and coal tar.
— Jordan de Haber, of Baden, for improvements in the manufacturing of beet-root sugar.
— Marie Albert Cochot, of Paris, for a steam generator with internal tubes.
— Edouard de la Rachée, of Paris, for an improved gun.
— Balthazar Joseph Mesnil, of Paris, for a new apparatus for preventing smoke from being driven in the interior of houses.
— Louis Joseph Deleuil, of Paris, for an improved barometer.
— Jean Baptiste Leroy Tribou, of Combrai, for an improved key for turning screw-nuts.
— Joseph Antoine Joachim Liebermann, of Paris, for an apparatus for extracting the juice of beet-root.
— Mangeon, of Paris, for a new method of connecting and unconnecting toothed wheels.
— Jacques Joseph Triquet, of St. George's, for an economical method of manufacturing boilers and generators.
— Augustin Zeiger, of Lyon, for improvements in organs.
— Francois Jean Berthomé, of Paris, for a syrup and an ointment for the cure of the ringworm.

To Joseph Dures de Boulimbert, of Chateauroux, for a reaping-machine.

— Pierre Luc Ciceri, of Paris, for a new process of ornamental painting.

— Antoine Regnault, of Dourlens, for a machine for making nails.

— Napoleon Felix Chodzko, of Paris, for an improved block for printing woven goods.

— Rattier and Guibal, of Paris, for new applications of caoutchouc to various purposes.

— Emile Martin, of Paris, for an improved method of extracting and employing gluten.

— Nicholas Charrois, of Paris, for a new gun-case.

— Sailly-Herbelot fils, and Genet Dufay, of Calais, for improvements in bobbin-net frames on the Levers' system.

— Lemire, Brothers, iron-masters, of Clairveaux, for an improved nail-machine.

— Marion de la Brillantais, of Paris, for a new method of panification.

— Lanet and Sornay, of Paris, for an improved filter.

— Jean Baptiste Mercier, of Candas, for a sack-cloth applicable to the straining of the pulp of beet-root.

— Toussaint Richard, of Lyons, for an improved cam-wheel, applicable to the working of iron.

— John Isaac Hawkins, of London, for a means of extracting fibrous substances from the leaf of the pine-apple plant.

— Pierre Leonard Cambaceres, of Paris, for extracting all the animal matter from dead animals by means of digestors.

— Joseph Philippe Jacquemart, for an iron frame for sky-lights, opening internally and externally.

— Francois Michel Magloire Beauvallet, of Paris, for an acidulated orange sugar.

— Marie Henri de Lubac, of Etoile, for an improved frame for the raising of silkworms.

— Jean Abadée, of Toulouse, for an improved box for wheels of carriages and other vehicles.

PATENTS FOR FIVE YEARS.

To Theodore Schwartz, of Stockholm, represented in Paris by Mr. Perpigna, advocate of the French and Foreign Office for Patents, Rue de Choiseul, for a new system of navigation.

— Andervolti, of Spilembergo di Friuli, in Italy, represented in Paris by Mr. Perpigna, for a new mechanism for directing balloons.

— Michel Boche, of Paris, represented by Mr. Perpigna, for an improved wadding for guns.

— Thomas George, and Rouillé, of Paris, represented by Mr. Perpigna, for improvements in the furnaces of locomotive or stationary engines.

— Jacques Lauranҫon, of Lyon, represented by Mr. Perpigna, for a kitchen stove.

— Francois Loisy, of Arras, for an improved evaporator to be used in the manufacturing of sugar.

— Blondeau de Carolles, and Philip Aix, for the extraction of gas from the residuum of olives, and its application to illumination.

— Jean Boirin, of St. Etienne, for an improved batten for the weaving of ribbons.

— Champonnois, senior, of Beaune, for an improved tub applicable to the washing of iron ore.

— Jean Faucher, of Paris, for an improved brush.

— Jean Croisat, of Paris, for an improved metallic comb.

— Victor Florian Duport, of Paris, for an apparatus applicable to the manufacturing of iron.

— Jean Charles Douville, of Paris, for an apparatus for feeding horses.

— Pierre Louis Simon, of Paris, for a mechanical head for walking-sticks.

— Armand Tizon, of Cantaleu, for a machine for applying several colours in succession on woven goods.

— Jean André Toussaint Barthelemy, of Marseille, for an improved cylinder for reviving animal charcoal.

List of Patents

Granted in Scotland between 22d March and 19th April, 1838.

To Henry Bessemer, of City-terrace, City-road, in the parish of St. Luke's, Old-street, and county of Middlesex, engineer, for an invention of certain improvements in machinery or apparatus for casting printing types, spaces, and quadrats, and the means of breaking off and counting the same.—28d March.

— Richard Tappin Claridge, late of Salisbury-street, Strand, but now of 8, Regent-street, gentleman, in consequence of a communication made to him from abroad, for an invention of a mastic or cement, or composition, applicable to paving and road-making, covering buildings, and the various purposes to which cement, mastic, lead, zinc, or composition are employed.—27th March.

— Jeremiah Bynner, of Birmingham, in the county of Warwick, lamp-maker, for an invention of improvements on lamps.—30th March.

— Augustus Coulon, of Tokenhouse-yard, in the city of London, merchant, partly in consequence of a communication made to him by a certain foreigner residing abroad, and partly by invention of his own, for an invention of improvements applicable to block-printing.—30th March.

— Joshua John Lloyd Margary, of Wellington-road, St. John's-wood, in the county of Middlesex, Esq., for an invention of a new mode of preserving animal and vegetable substances from decay.—30th March.

— Julius Oliver, late of Castle-street, Falcon-square, in the city of London, but now of Queen-street, Golden-square, in the county of Middlesex, gentleman, in consequence of a communication from a certain foreigner residing abroad, for an invention of a certain improvement in the filters employed in sugar-refining.—6th April.

— Charles Wye Williams, of Liverpool, in the county of Lancaster, gentleman, for an invention of certain improvements in the

means of preparing the vegetable material of peat-moss or bog, so as to render it applicable to several useful purposes, and particularly for fuel.—6th April.

To Alexander Happey, of Basing-lane, in the city of London, gentleman, in consequence of a communication from a foreigner residing abroad, for an invention of a new composition applicable to paving roads, streets, terraces, and other places, which improvements are also applicable to the different purposes of building, and also in the apparatus for making the said composition.—9th April.

— John Stewart of Glasgow, in that part of the United Kingdom of Great Britain and Ireland called Scotland, for an invention of improvements in machinery for manufacturing ropes, lines, twines, and yarns, from hemp, flax, or tow.—12th April.

— Marie Claudine Veronise Lenoble, of Leicester-square, in the county of Middlesex, for an invention of certain bituminous mastics or cements capable of receiving various colours, which compositions are applicable to various useful purposes.—17th April.

— Michael Wheelwright Ivison, silk-spinner, residing in Hailes-street, Edinburgh, for an invention of an improved method for consuming smoke in furnaces and other places, where a fire is used, and for economising fuel, and also for supplying air, heated or cold, to blasting or smelting furnaces.—19th April.

New Patents

SEALED IN ENGLAND.

1838.

To Julius Jeffreys, of Kensington, in the county of Middlesex, Esq., for his invention of improvements in stoves, grates, and furnaces.—Sealed 24th March—6 months for inrolment.

To John Clark, the younger, of Mile-end, Glasgow,

cotton-spinner, for his invention of improved machinery for turning, some part or parts of which may be made applicable to other useful purposes.—Sealed 4th April—6 months for inrolment.

To William Angus Robertson, of Peterborough-court, Fleet-street, in the city of London, patent agent, for certain improvements in the manufacture of hosiery, shawls, carpets, rugs, blankets, and of other fabrics, being a communication from a foreigner residing abroad.—Sealed 4th April—6 months for inrolment.

To George Barnett, of 49, Jewin-street, in the city of London, tailor, for his invention of an improved button for protecting the thread or shank from friction and wear.—Sealed 7th April—2 months for inrolment.

To Joseph Rock Cooper, of Birmingham, gun-maker, for his invention of improvements in fire-arms.—Sealed 10th April—6 months for inrolment.

To John Watson, of Addle-hill, Doctors'-commons, in the city of London, mechanic, for his invention of improvements in stoves.—Sealed 10th April—6 months for inrolment.

To David Redmund, of Wellington-foundry, Charles-street, City-road, in the county of Middlesex, engineer, for his invention of certain improvements in the construction and apparatus of steam-boats or vessels used for war or commercial purposes.—Sealed 10th April—6 months for inrolment.

To Edward Cobbold, of Long Metford, in the county of Suffolk, clerk, and Peter Richold, the younger, of the same place, coach-maker, for their invention of improvements in the manufacture of certain pigments or paints, or such like substances.—Sealed 10th April—6 months for inrolment.

To William Fothergill Cooke, of Breed's-place, Hastings, Esq., for his invention of improvements in giving signals, and sounding alarms at distant places, by means of elastic currents transmitted through metallic circuits.—Sealed 18th April—6 months for inrolment.

To William Barnett, of Brighton, iron-founder, for his invention of certain improvements in the production of motive power.—Sealed 18th April—6 months for inrolment.

To Thomas Murray Gladstone, of Bootlecum Linacre, near Liverpool, in the county of Lancaster, chain-cable and anchor manufacturer, for his invention of certain improvements in ship's windlasses, which improvements are applicable to other purpos es.—Sealed 21st April—6 months for inrolment.

To Edward Cooper, of Staverton, in the county of Wilts, clothier, for his invention of an improvement in the making or manufacturing of soap.—Sealed 21st April—6 months for inrolment.

To James Timmins Chance, of Birmingham, glass manufacturer, for his invention of improvements in the manufacture of glass.—Sealed 21st April—6 months for inrolment.

To James Macnede, coach-maker, George-street, Edinburgh, for his invention of an improvement or improvements in carriages.—Sealed 21st April—2 months for inrolment.

To Moses Poole, of Old-square, Lincoln's-inn, in the county of Middlesex, gentleman, for improvements in manufacturing of carpets, rugs, and other napped fabrics, being a communication from abroad.—Sealed 21st April—6 months for inrolment.

To Christopher Nickels, of York-road, Lambeth, manu-

facturer, for improvements in machinery for recovering fibres applicable to the manufacture of braid and other fabrics.—Sealed 21st April—6 months for inrolment.

To Robert Finlayson, of Regent-street, Cheltenham, in the county of Gloucester, M.D., for his invention of improvements in harrows.—Sealed 21st April—6 months for inrolment.

To Francis Pope, of Wolverhampton, in the county of Stafford, fancy iron-worker, for his invention of certain improvements in machinery for making or manufacturing pins, bolts, nails, and rivets, applicable to various useful purposes.—Sealed 24th April—6 months for inrolment.

To Thomas Vaux, of Woodford-bridge, in the county of Essex, land surveyor, for his invention of improvements in tilling and fertilizing land.—Sealed 24th April—6 months for inrolment.

To Samuel Wagstaff Smith, of Leamington Priors, in the county of Warwick, iron-founder, for his invention of improvements in regulating the heat of furnaces for smelting iron, which improvements may also be applied to retorts for generating gas.—Sealed 24th April—6 months for inrolment.

To Alexander Happey, of Basing-lane, in the City of London, gentleman, for a new composition, applicable to paving roads, streets, terraces, and other places, which improvements are also applicable to the different purposes of building, and also in the apparatus for making the said composition, being a communication from a foreigner residing abroad.—Sealed 25th April—6 months for inrolment.

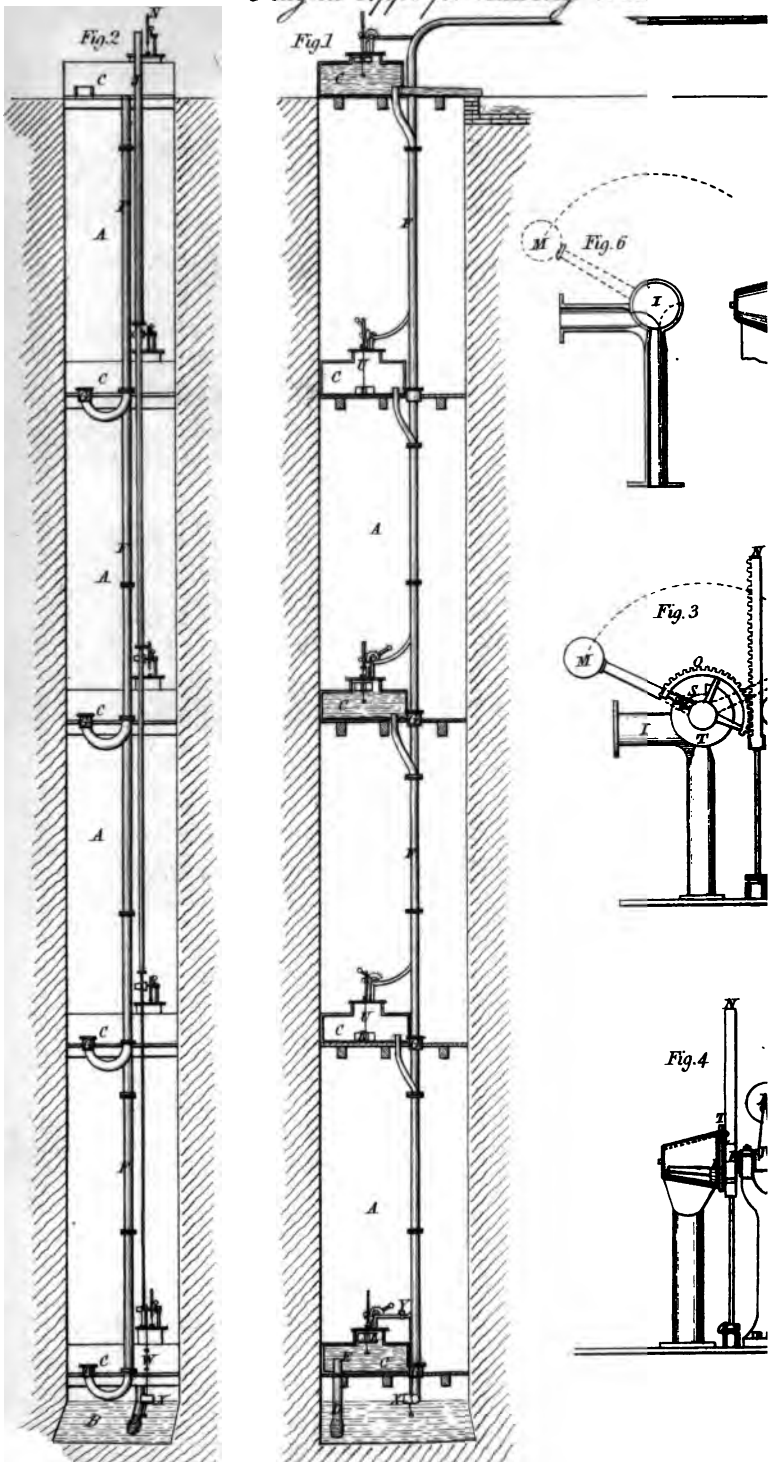
To Richard Goodwin, of St. Paul's-terrace, Camden Town, in the county of Middlesex, coal-merchant, for his invention of an improved prepared fuel.—Sealed 26th April—6 months for inrolment.

CELESTIAL PHENOMENA, FOR MAY, 1838.

D.	H.	M.	
1			Clock after the sun, 3m. 2s.
—			☽ rises 10h. 11m. M.
—			☽ passes mer. 6h. 30m. M.
—			☽ sets 2h. 11m. M.
	2	5	☽ in □ or first quarter.
2	10	51	♃'s third satt. will im.
	14	4	♃'s third satt. will em.
	17	53	Vesta in conj. with the ☉
3	9	21	♃ in conj. with the ☽ diff. of dec. 1. 46. S.
	19		☽ in Apogee.
5			Clock after the sun, 3m. 29s.
—			☽ rises 2h. 59m. A.
—			☽ passes mer. 9h. 15m. M.
—			☽ sets 3h. 7m. M.
	18	37	♃ stationary.
6	9		☿ stationary.
8	12	13	♃'s fourth satt. will im.
9	4	58	Ecliptic oppo. or ○ full moon.
	9	22	♃'s first satt. will em.
	21	38	♄ in conj. with the ☽ diff. of dec. 6. 8. N.
10			Clock after the sun, 3m. 50s.
—			☽ rises 9h. 17m. A.
—			☽ passes mer. 0h. 7m. M.
—			☽ sets 4h. 8m. A.
13	12	55	♀ greatest elong. 45. 59. W.
	16	39	☿ in the descending node.
15			Clock after the sun, 3m. 57s.
—			☽ rises 1h. 10m. M.
—			☽ passes mer. 4h. 51m. M.
—			☽ sets 8h. 40m. M.
16	9	42	☽ in □ or last quarter.
	10	6	♄ in oppo to the ☉
	11	17	♃'s first satt. will em.
17			Mer. R. A. 3h. 36m. dec. 18. 24. N.
—			Venus R. A. 0h. 39m. dec. 2. 37. N.
—			Mars R. A. 2h. 25m. dec. 15. 56. N.
—			Vesta R. A. 3h. 9m. dec. 13. 12. N.
—			Juno R. A. 18h. 9m. dec. 5. 41. S.
—			Pallas R. A. 5h. 16m. dec. 1. 32. S.
17	—		Ceres R. A. 6h. 41m. dec. 27. 56. N.
—			Jupiter R. A. 10h. 44m. dec. 9. 25. N.
—			Saturn R. A. 15h. 35m. dec. 16. 55. S.
—			Georg. R. A. 22h. 55m. dec. 7. 44. S.
—			Mercury passes mer. 23h. 51m.
—			Venus passes mer. 21h. 0m.
—			Mars passes mer. 22h. 45m.
—			Jupiter passes mer. 7h. 4m.
	3	10	☿ in inf. conj. with the ☉
	12	29	♅ in conj. with the ☽ diff. of dec. 2. 4. N.
18	9	40	♃'s second satt. will em.
19	12		☽ in Perigee.
	18	45	♀ in conj. with the ☽ diff. of dec. 1. 59. S.
20			Clock after the sun, 3m. 49s.
—			☽ rises 2h. 33m. M.
—			☽ passes mer. 9h. 5m. M.
—			☽ sets 3h. 56m. A.
21	19	59	♂ in conj. with the ☽ diff. of dec. 3. 9. S.
22	15	55	☿ in conj. with the ☽ diff. of dec. 6. 9. S.
23	4	23	Ecliptic conj. or ● new moon.
	20	3	☿ in Aphelion.
24	19	2	Vesta in conj. with ☿ diff. of dec. 1. 22. S.
25			Clock after the sun.
—			☽ rises 4h. 33m. M.
—			☽ passes mer. 1h. 39m. A.
—			☽ sets 10h. 49m. A.
	9	43	♃'s fourth satt. will em.
	12	17	♃'s second satt. will em.
29	7	53	☿ stationary.
30			Clock after the sun, 2m. 53s.
—			☽ rises 10h. 22m. M.
—			☽ passes mer. 5h. 52. A.
—			☽ sets 0h. 51m. M.
	19	12	♃ in conj. with the ☽ diff. of dec. 1. 35. S.
31	6	50	♃ in □ with the ☉
	7	35	☽ in □ or first quarter.
	12		☽ in Apogee.

J. LEWTHWAITE, Rotherhithe.

Hagues' Appᵗˢ for raising Water



THE

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CONJOINED SERIES.

No. LXXV.

Recent Patents.

To JOHN HAGUE, *of Cable-street, Wellclose-square, in the parish of St. George in the East, in the county of Middlesex, engineer, for raising water by the application and arrangement of a well-known power, from mines, excavations, holds of ships or vessels, and other places where water might be deposited or accumulated, whether from accidental or natural causes, and also applying such power to, and in giving motion to certain machinery.*—[Sealed 9th May, 1836.]

THE Patentee describes his invention in the following words:—Fig. 1, Plate VI., is a vertical section of a pit or shaft of a mine, with my machinery affixed therein; and fig. 2, an end view and section of the same apparatus, the letters of reference indicating the similar parts in both figures: A, A, represent the pit or shaft; B, the water accumulated at the bottom of the shaft; C, C, C, C, C, close

or air-tight vessels, tanks or cisterns; these may be placed above each other at any distance under the atmospheric pressure, and may be made of any convenient shape or form, suitable to the purposes required; they may also be made of cast iron, or wrought iron, or of copper, wood, or any other fit and proper materials, which may be best calculated for the purpose, but I prefer cast iron: D, is a metal pipe or strainer, which is also termed a suction-pipe or wind-bore, being perforated all over its lower part with holes, to admit the water, but to prevent the passage of large bodies into the pipe. On the upper end of this pipe D, is placed a valve E, opening so as to suffer the water to flow into the tank or cistern, but also closing when the cistern is full, to prevent the return of the water: F, F, F, F, are four pipes or rising mains, the lower end of each being connected with a valve-box G, G, G, G, placed at the bottoms of the tanks or cisterns, their upper ends passing through the bottoms of the cisterns above them, and rising a little above the said bottoms. The valves in the boxes G, G, G, G, open forwards, to allow the water to ascend through the pipes F, F, F, F, but close to prevent it from returning into the tanks or cisterns. From the uppermost tank or cistern, a spout H, with a valve at its end opening outwardly, proceeds to discharge the water so raised to the surface: I, I, I, I, I, fig. 1, represent five three-way cocks and their appendages. These cocks are mounted in branch pipes, which proceed from a main exhausting or vacuum-pipe J, J, J, J, J, which is connected with an air vessel or receiver K. This main exhausting pipe is better seen at J, J, in fig. 2. The conical plugs of these three-way cocks are put into motion in the following manner:—L, L, L, L, L, fig. 1, are five hollow copper boxes or floats, of sufficient buoyancy to raise the balls of the tumblers M, M, M, M, M, from their state of rest, passed their centre of gravity, and as shown,

on a larger scale, in fig. 3, by the dotted lines. These floats are caused to slide freely upon metal rods, which are passed through holes formed in the centres of the floats. At the lower ends of these rods are formed stops, for the floats to rest upon when the water in the tanks or cisterns is discharged. At the upper ends of these rods are affixed toothed racks, such as that shown on a larger scale at N, in fig. 3. These racks act in toothed sectors, similar to that shown at O, in fig. 3, and are kept in gear by the guide rollers P, at their backs. The rods pass through stuffing-boxes, mounted upon the tops of the cisterns, and as shown at Q, in figs. 3, and 4. The tumblers M, M, M, M, M, are each mounted upon a separate axis, turning in bearings, mounted upon standards or pillars, and as shown more clearly in fig. 4; upon each axis is also affixed the toothed sector O, as is shown in fig. 3. Upon one of the arms of this sector O, is affixed a pin R, which projects within a circular gap S, in the plate or flanch T, affixed upon the conical plug of the cock I, as shown in fig. 3. At each end of the gap S, are stops, against which the pin R, falls, when the tumbler M, has passed its centre of gravity. Besides the stops at the bottoms of the rods upon which the floats rest, there are also others affixed at a proper distance above, as shown at U, U, in fig. 1. When the water is rising in the tanks or cisterns, the floats rise with it, and acting against the stops U, U, carry the rods upwards with them, and also the toothed racks at their upper ends, which, acting in the toothed sectors O, O, cause the tumblers M, M, to pass their centres of gravity, and fall against one of the stops in the gap S, and turn the plug I, of the cock, so as to shut off the vacuum, and open the passage to the atmosphere. When the water is discharged from the tanks, the floats, by their weight, and being lodged upon the stops at the lower ends of the rods, cause the tumblers to again act in the

reverse way, and re-open the cocks, so as to shut off the communication with the atmosphere, and open the passage to the main vacuum-pipe, and as shown at fig. 6.

Fig. 3, is a front view of the cock and appendages; fig. 4, is a side view of the same; fig. 5, a top view thereof, showing the tumbler by its pin or stud R, acting upon the plug of the cock; and fig. 6, is a section through the barrel and plug of the cock and the vacuum-pipe, shown upon a larger scale. The air-vessel or receiver K, is connected or united with an air-pump or pumps, which is or are worked either by steam, water, wind, animal or other power, or hoist-mover. This receiver K, may be placed at any convenient distance from the mouth of the pit or shaft, and be connected with the vacuum-pipe J, J, by extending that pipe accordingly; or it may also be made to connect with several vacuum-pipes by similar means. At the lowest tank or cistern C, or fig. 1, V, is a cock mounted in the branch-pipe, leading from the cock I, to the main vacuum-pipe J. To a lever mounted upon the plug of the cock V, a rod W, is affixed at its farther end. This rod descends through two guides affixed on the outside of the tank C; it has a stop at its lower end, and another at a proper distance above it: upon this rod, and between the stops, a hollow copper float X, is mounted, which can slide freely up and down between the two stops. This float lies upon the surface of the water in the pit or shaft, rising and falling with it. When the water gets so low as to allow the float to rest upon the stop at the bottom of the rod, the weight of the float shuts the cock V, and prevents the suction-pipe, or wind-bore D, from drawing air. When the water in the pit or shaft accumulates, it raises the float X, until it acts against the upper stop on the rod, which re-opens the cock, and puts the machinery again into action, and which continues until the water again falls too low, as above men-

tioned. In case of a steam-engine being employed as a first moving power, an inverted syphon, filled with mercury, may be connected on one side with the main vacuum-pipe, leading from the air-pump, and have a float resting in the mercury in the other leg, from which a rod may proceed, connected with a lever mounted upon the axis of a throttle-valve placed in the pipe, which brings the steam from the boiler to the engine, and thus, by regulating the supply of steam, retards or accelerates the motion of the steam-engine. Although the pit or shaft may be miles distant from the steam-engine, yet the float x, in the water at the bottom of the pit, becomes the regulator of the motion of the steam-engine. In case of having to raise water from excavations, holds of ships or vessels, or where the depth is not so great as the atmospheric pressure, one lift will be found sufficient, and the air-pump may be frequently worked even by hand, or by the power of horses.

To apply my said invention to give motion to certain machinery, such, for instance, as whimsies for raising coals or ores, or other substances from pits or shafts, and also for actuating stamping-mills, crushing or grinding mills, cotton or woollen machinery, gunpowder mills, towing of canal boats, locomotive-carriages on common and rail-roads, ploughs, thrashing-machines, rolling-mills for metal and other substances, paper-mills, turning and boring lathes, blowing-engines, and saw-mills, I cause the vacuum to act upon one or both sides of the pistons working in cylinders, after the manner of steam-engines, in the same manner as described in a patent formerly granted to me, for working cranes and tilt-hammers, or forge hammers, and which, therefore, need not be more particularly described here.

I do not mean or intend hereby to claim as my invention, any particular forms or arrangements of machinery,

nor any of the parts herein shown and described, which may have already been used, but only in connexion in the manner herein shown and described; but I do hereby claim as my invention, the raising of water without its entering the working barrels of pumps. I do not mean or intend hereby to confine or limit myself to the employment of any particular material or materials, in the construction of the different parts of the apparatus, but to employ any which are fit and proper for the purpose.—[*Inrolled in the Inrolment Office, November*, 1836.]

To John Paul Newmann, *of* 81, *Great Tower-street, in the city of London, prussiate of potash-maker, for his invention of improvements in the manufacture of prussiate of potash and prussiate of soda, being partly of his own invention, and partly communicated to him by a certain foreigner residing abroad.*—[Sealed 11th January, 1837.]

According to the ordinary means of manufacturing prussiate of potash and prussiate of soda, in respect to that part of the process which consists of submitting the materials (dry animal matter and pearl-ash or soda) to be mixed and melted to be converted into a chemical compound. The materials are to be put into a semi-elliptical iron pot or vessel, which is suitably set in a furnace that the fire may act externally at the bottom and sides, and the heat which comes to the materials being operated on, passes through the iron pot or vessel; hence, the vessel is subject to become quickly injured, and in case of holes being produced when it is charged with the melted compound, the same may run through to the fire and be wasted, and in such means of applying heat the fetid vapours pass away into the atmo-

sphere, and cause a nuisance to the surrounding neighbourhood. And there have been apparatus or vessels employed in the making of prussiate of potash, which are closed with the exception of one point, to which pipe for conducting such fetid vapours and gases to other apparatus was employed, as is described in the specification of a patent granted to Herman Hendricks, the 19th day of October, 1833: but in such cases the fire was applied to the external surface of the iron cylinders or vessels which contained the matters under operation, such vessels being equally prejudicially acted on by the fire, and liable to have holes produced therein.

Now, the object of the present invention, is to cause the fire to act on the upper surface of the materials to be operated on, and in such manner that the heat and flames of the fire act directly on the materials; and in addition to giving off the requisite heat thereto for melting or calcining (as by some it is technically called), also destroys all, or nearly all, the fetid smells of the vapours and gases, which were formerly so objectionable in the vicinity of a prussiate work; and in addition to which, the vessels containing the matters under operation are not so liable to be destroyed by the action of the fire, nor can the loss be material should a hole be made in the pot or vessel, as it is set on a bed of sand. Having thus stated generally the nature of the invention, I will proceed to describe the accompanying drawing.

Fig. 1, Plate VII., represents a longitudinal section of a furnace and pot or vessel suitably arranged for carrying out the improvements: fig. 2, is a plan of the furnace and pot or vessel, the upper part of the brickwork being removed, that the internal construction of the furnace may be more readily understood. On examination of the drawing, it will be seen that the furnace is for the most part similar to an

ordinary reverberatory furnace; *a, a*, is the melting or calcining pot or vessel; *b, b*, is the furnace, the heat and flames of which pass over the materials placed in the pot or vessel *a, a*, and the heat is reverberated by the upper part of the furnace down to such materials.

The nature of this part of the process of prussiate of potash and prussiate of soda being well understood by prussiate makers, and such being the case with respect to matters or materials used, no description of the same need be given in this my specification, further than to state, that supposing a charge of the furnace has just been withdrawn at the opening *c*, of the furnace, which drawing is performed by a ladle or otherwise, the fire in the furnace should be supplied with fresh coal, should it require feeding; for it should be stated, that the coal should not be put to the furnace during the time that the materials to produce the chemical compound in the pot or vessel *a, a*, are being operated on, but the fire should be as clear as possible. The workman will submit the materials under operation to stirring and heating, as heretofore practised, which he will readily be able to do through the opening *c*, through which he will see how the operation is proceeding, and he will judge when the conversion of the materials into a chemical compound is completed by the appearance of the melted or fluid matter, and the cessation of fetid vapours; and it will be evident that during the process of the conversion of the materials or matters into the chemical compound desired, the vapours rising therefrom will combine with the frames and heat of the furnace and be burned, and the fetid smells will be destroyed, which is a very important feature of the present invention.

Having thus described the nature of the invention, and the manner of carrying the same into effect, I would remark that variations in the furnace and pot or vessel may

be made, provided the object of the invention be retained. And I would have it understood, that the improvements claimed under the present Letters Patent, consist in causing the heat and flame to act directly on the materials, and give off the requisite heat thereto, and also to burn or destroy the fetid vapours arising in that part of the process of making prussiate of potash or prussiate of soda, above described.—[*Inrolled in the Inrolment Office, July,* 1837.]

To GEORGE LOWE, *of Brick-lane, Old-street, in the county of Middlesex, civil-engineer, for an invention for increasing the illuminating power of such coal gas as is usually produced in gas-works; also for converting the refuse products from the manufacture of coal gas into an article of commerce not heretofore produced therefrom; and also a new mode of conducting the process of condensation in the manufacture of gas for illumination.*—[Sealed 9th June, 1832.]

As regards the first part of the same, in increasing the illuminating power of such coal gas as is usually produced in gas-works, by impregnating such gas with naptha, commonly called spirit of coal tar, or with any other volatile hydro-carbonaceous liquid, the method I adopt for so impregnating the said gas, is my merely filling the case of the common gas-meters to the usual height with any of the said liquids, instead of water; by which means the said gas, discharged from the meters to the burners, is, during the operation of measuring, sufficiently impregnated with the said liquid in the meter-case. It is important to maintain a proper and uniform supply of such liquid in the meter-case, and this may be effected by means of any self-acting apparatus, such as the bird-fountain.

As regards the second part of the same, in converting the refuse products from the manufacture of coal gas into an article of commerce not hitherto produced therefrom, which article is Prussian blue, either in its separate or pure state, or in combination with sulphate of lime; in the first case, I obtain it from the ammoniacal liquor; and in the second, from the refuse lime liquor which has purified the gas. In order to obtain the said Prussian blue from the ammoniacal liquor, I well mix about an ounce of sulphate of iron or green vitriol (in solution with water) with every imperial gallon of the ammoniacal liquor of the specific gravity of 1.031; and when so mixed, I super-saturate the liquor by adding sixteen ounces of sulphuric acid, or oil of vitriol, of the specific gravity of 1.850, when there will be found a blue precipitate subsiding to the bottom of the super-saturated liquor, which is the Prussian blue, and which may be collected by decanting or filtration, and then washed and dried in the usual manner for obtaining Prussian blue.

If the same process be applied to the refuse lime liquor of gas-works, the quantity of sulphate of iron should be one ounce and a half to one imperial gallon of lime liquor of the specific gravity of 1.043, and the quantity of sulphuric acid to be added for the purpose of super-saturation, should be about fourteen ounces, when a quantity of sulphate of lime will be deposited along with the Prussian blue; which combined substances, after being collected, washed, and dried, as usual, will be found to be a colouring matter highly useful in the arts.

And, lastly, as regards the third part of my said invention, in a new mode of conducting the process of condensation in the manufacture of gas for illumination, which is by allowing the coal tar to pass off at different parts of the condenser while in operation, so that it may be collected in different portions, each portion of which will thus be of a

different degree of temperature, and, consequently, of a different specific gravity. This object I effect by the apparatus shown in the accompanying drawing.

Fig. 3, Plate VII., represents a condenser: A, B, C, is a long pipe, inclining downwards from the end A; D, E, F, G, H, are five self-acting syphons, from which the coal tar is continually flowing, that portion flowing from D, being of the highest temperature, and, therefore, of the greatest specific gravity; J, is an induction pipe for introducing steam into the condenser, for the purpose of retarding the condensation of the more volatile parts of the coal tar. It is very evident, from this figure, that many of the condensers now in use, especially Perks's patent condenser, can be readily altered so as to effect the purpose of this part of my said invention.

Now whereas, with reference to increasing the illuminating power of such coal gas as is usually produced in gas-works, it is evident there are many other ways of impregnating it with naptha, or other volatile hydro-carbonaceous liquids, than the one hereinbefore described; but I claim generally, as regards this part of my said invention, the impregnating such coal gas as is usually produced in gas-works with any of the liquids aforesaid, in any convenient manner.

And further, as regards that part of my said invention which relates to converting the refuse products from the manufacture of coal gas into an article of commerce not heretofore produced therefrom, I claim as my invention, the production of Prussian blue, either in its separate or pure state, or in combination with sulphate of lime, from the ammoniacal liquor and refuse lime water of gas-works.

And, lastly, with reference to my new mode of conducting the process of condensation in the manufacture of gas for illumination, I am aware that the same effect which I

have hereinbefore described may be produced by employing separate condensers working at different degrees of heat; but I claim, as regards this part of my said invention, the allowing the coal tar to pass off at the same time from different parts of the same condenser, or from a series of several condensers working at different degrees of temperature at the same time, whereby I am enabled to procure the tar condensed at different temperatures in separate portions. [*Inrolled in the Inrolment Office, December,* 1832.]

To JOHN HAGUE, *of Cable-street, Wellclose-square, in the county of Middlesex, engineer, for his invention of certain improvements on wheels for carriages.*—[Sealed 10th May, 1836.]

THIS invention relates to that class of wheels which are employed on railways, as will be hereafter explained.

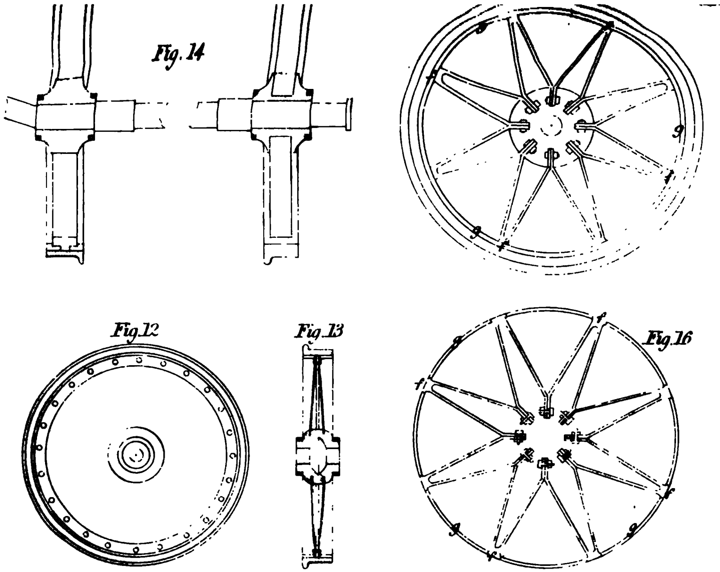
Fig. 14, Plate VIII., represents an edge view, in section, of a railway carriage wheel, constructed according to my invention; fig. 15, is a side section of fig. 14; and fig. 16, shows the mode of combining the spokes together previously to casting the nave thereon. The spokes are formed by means of flat bars of iron, which are either shut or welded together at the point *f*; or otherwise, a bar of iron, of the length of two spokes, may be bended over at the point *f*; and then the point *f*, is to be forged into a tenon, as is shown in the drawing: the other ends of the spokes are bent in towards each other in such manner, that when the number of which a wheel is to be composed are placed together, they will be together surface to surface, and in that form will have the cast iron nave run on in a similar manner to what has long been practised in casting the naves of wheels on to ordinary wrought iron spokes, and is well understood,

Fig. 14

Fig. 12

Fig. 13

Fig. 16



A. Houghton's Impd Lamp

Fig. 1

Fig. 2

Fig. 10

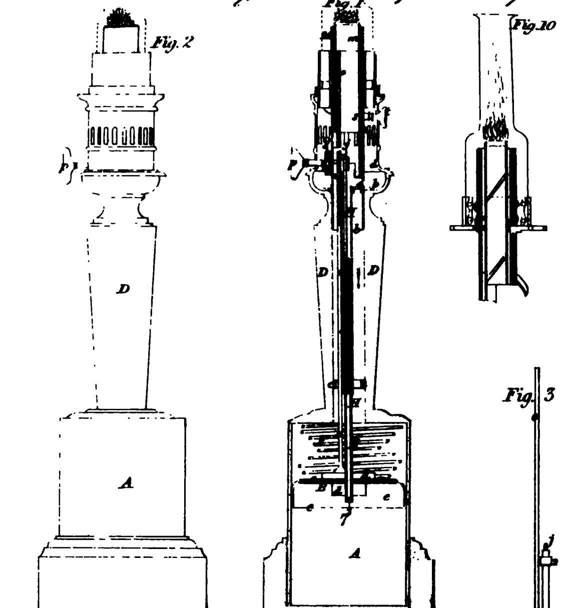


Fig. 6

Fig. 7

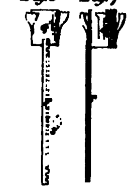
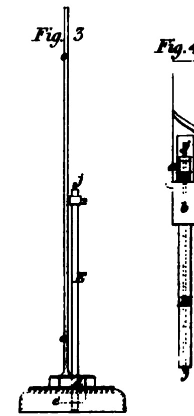


Fig. 3

Fig. 4



Nash & Ross's Impts in making Letters

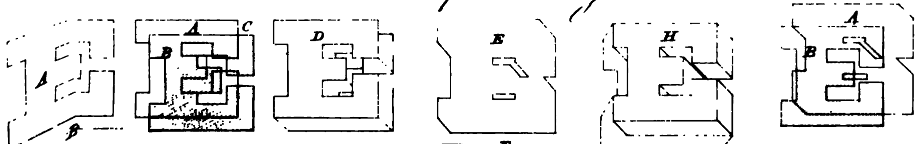
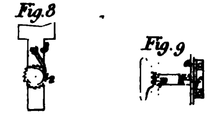


Fig. 8

Fig. 9



Del.

1st June 1853.

G. Winter Sculpt.

though I prefer that it should be performed as hereafter described. In putting the parts of this wheel together, the tenons of the spokes are first placed in mortices or holes formed in the ring or felloe *g*, which, in this instance, may be of cast or wrought iron; but I prefer wrought iron. If a cast iron felloe be used, it is preferable to have it run on to the spokes, they being suitably placed in a mould for that purpose; and the ring or felloe should be cast first, and then the nave is to be cast on when the felloe is cold. By the mode in which the spokes are formed, and their ends, which are cast in the nave, butting together, each spoke, when meeting any shock or pressure, transmits it to the next spoke; and the wheel so constructed, will be found a highly useful wheel, and capable of enduring the shocks to which railway wheels are subject; or, in place of employing two plates for the spokes, four bars may be used, joined together at the point where they enter the felloe or ring, but the upper ends are to be shaped like those last described, so that the ends which are cast within the nave be together and butt against each other, and then come down to a point at the part *f*, as above described, and, when laid together, touch and assist each other in supporting shocks.

The second part of my invention consists in a mode of casting on naves of wheels to wrought iron spokes, by the application of brass or copper, for the purpose of making or fixing of the spokes in the cast iron naves; and in order to perform this part of my invention, I prepare the ends or surfaces of the spokes (or such like instruments which connect the nave with the ring or felloe) which are to be cast into the nave by first dipping such ends into a solution of acid, in order to remove the scale or oxide, as commonly practised, and as is well understood: having made such surfaces clean, I dip so much of the end of the spoke (as is

to be contained in the cast iron nave) in water, and dust borax over the same; when dry, that part of the spoke is to be made red hot, and immediately dipped into melted brass or melted copper, by which that part of the spoke will become coated, and when the cast iron nave is cast thereon, the spokes will be more securely retained therein than when the spoke without such coating is cast into the nave, as is the practice with those iron wheels now made. And, further, in order securely to connect the spokes, or such like instruments, with the outer ring or felloe, I place the spokes or felloe over a fire, and cause borax to melt thereon and run into the joints; and having done so, I apply brass or copper, which is broken very small; and it is well known that as the same melts, it will follow into those places where the borax has previously gone, by which means I braze the parts together.

Having thus described the nature of my invention, and the manner of performing the same, I would have it understood that I am aware that variously-constructed wheels have been before made of wrought and cast iron, I do not, therefore, claim such wheels generally, but only when combined according to my improvements. And, further, I do not claim the coating of iron with copper or brass when used for other purposes; and I do declare, that what I claim as my invention is, first, the mode of constructing the spokes, by bringing plates or bars of iron to a point at *f*, where it is connected with the felloe, and producing an angle up to the nave, and then bending inwards to each other; and when the number for constituting a wheel are laid together, they touch and lie together as above described. Secondly, I claim the coating of the spokes (or such like instruments by which the nave and felloe are combined) with copper or brass, in order, when the nave is cast thereon

. . . for making the Prussiate of Potash

Fig. 1

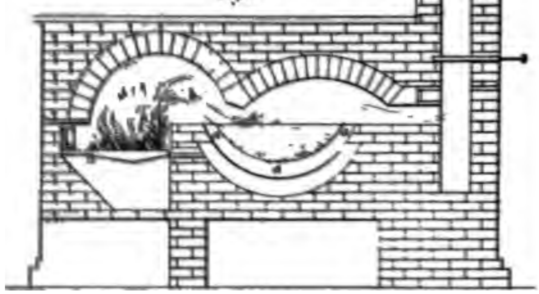
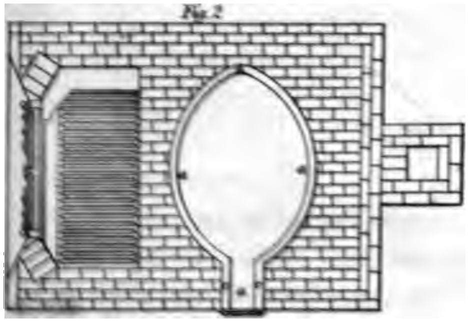
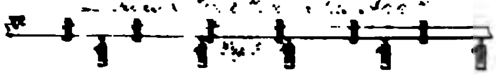
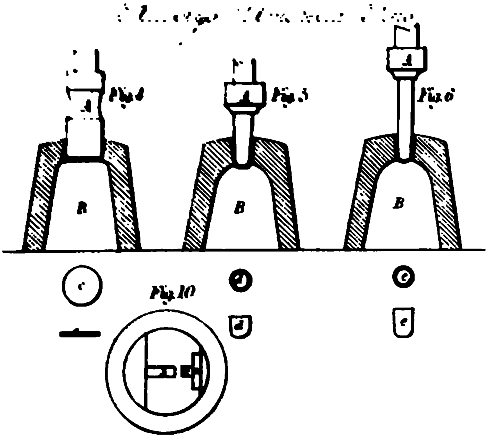
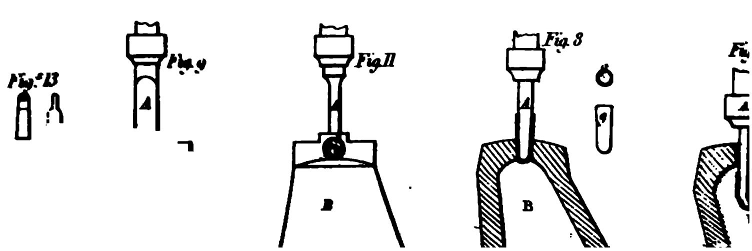


Fig. 2









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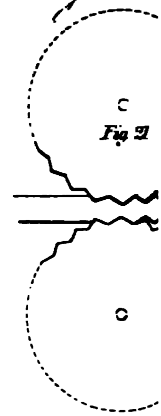
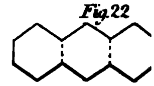
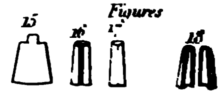


Fig. 22



Bowers Imp. in

Figures



the same may be more securely combined with the spokes. And, further, I claim the brazing the spokes to the ring or felloe.—[*Inrolled in the Inrolment Office, November*, 1836.]

To JOHN JEREMIAH RUBERY, *of Birmingham, in the county of Warwick, umbrella furniture-manufacturer, for an invention of certain improvements in the manufacture of parts of an umbrella, being partly a communication from a foreigner residing abroad.*—[Sealed 14th November, 1837.]

THESE improvements in the manufacture of part of the furniture of an umbrella, consist in a novel or improved mode, manner, or method of making or manufacturing the metal tips commonly called or known by umbrella furniture-manufacturers by the name or term of "top tips," or those parts of umbrella furniture which are placed upon the ends of the whalebone or other ribs, and fit into the "wheel" or notches formed in the wheel, and have a wire passed through holes made in them for the purpose of forming the joints upon which the ends of the ribs turn in opening and closing the umbrella.

These improvements consist in making or manufacturing the said top tips from out of *rolled or sheet metal* by a system of operations with pressing tools, as dies and punches, placed in and worked by a fly-screw, press, or other suitable stamping-press, worked by hand or other means, in contradistinction to the old or ordinary manner or method of manufacturing metal top tips by hand, which has heretofore been effected by drilling, turning, and forming such top tips from out of solid metal, cast in the usual or common manner.

And I will now proceed to describe the manner or method

of performing the different operations or processes in manufacturing the metal top tips after my improved manner, referring to the accompanying drawings in Plate VII. to illustrate the same, which are several sectional diagrams or figures of the tools or punches and dies, all the figures showing the punches and dies after the operation. These tools, punches, and dies, are to be placed in screw or other presses, and operated upon in the ordinary way of working such kind of tools, but which it is not necessary for me to describe.

I first take rolled or sheet metal of the proper hardness and thickness, and then punch out the round blank *c*, by means of a simple punch and counter-die, as shown at A, B, in fig. 4; the sheet metal *a*, being placed upon the counter-die, the punch descends and cuts out the disc or blank shown in front and side views at *c*. This blank is then placed into the counter-die B, at fig. 5, as shown in the drawing, when the punch A, descending, forces the blank, by means of the shape or form of the interior of the counter-die, into the cup-shape form, shown at *d*. This cup-shaped piece is then carried to the die and punch at fig. 6, and placed in the aperture of the former, as shown in this figure: the punch then descending, forces this cup-shaped piece *d*, into a further elongated conical cup-shaped piece, or what may now be termed a "ferule," at *e*, the metal being obliged to take this figure by the shape or form of the punch and die. The piece or ferule *e*, is then placed in the aperture of the die fig. 7, when a similar operation and action is performed, causing the ferule *e*, to take the form shown at *f*, in this figure, which is then placed as shown in another pair of punches and dies, as shown in fig. 8, when another similar pressing operation takes place, which forces the ferule *f*, into the proper or required shape of the top tip at *g*, which is now ready to have its

smaller end compressed or flattened into the required shape or form, so as to complete the top tip without the necessity of forming or shaping it with a file, or other cutting tool, as in common. This compressing, shaping, or forming of the end of the top tip, is effected in suitable-shaped compressers, dies, and punches, as shown in section at fig. 9, the die and punch being shown a part in the upper figure with the unfinished top tip placed in it, and in the lower figure with the same compressed or flattened by the descent of the punch. Fig. 10, is a plan view of the counter-die; figs. 11, and 12, are front and side views of the dies when brought together; fig. 13, shows the top tips completed, with the hole drilled and punched therein. The end of the unfinished top tip *g*, fig. 8, is placed by the attendant through the guide or aperture 1, into the recess 2, see figs. 9, and 10; on the punch descending, the part 3, of the punch presses upon the end of the top tip, and compresses it into the required shape; the other part 4, of the punch, passing into the recess 5, and which acts as a guide and stop for the same, so that the end may not be compressed too much. After the top tips have been so formed, they are to have the holes for the joint wires drilled or punched in them in any convenient manner, when the same may be cleaned in the ordinary manner of cleaning such kind of metal articles, and the top tips will be ready for use.

Having now described one method of making or manufacturing these improved top tips, I will proceed to state some variations in the same, which may be used with good effect (although I prefer the one above described); for instance, my improved top tips may be formed and shaped as at *g*, fig. 8, from out of sheet metal, in the following manner, instead of the process described in reference to figs. 4, 5, 6, and 7: this may be done by punching or cutting out pieces of sheet metal of the form, fig. 15, and then

bending, rounding, and forming the same in the shape fig. 16, when the junctions of the same are to be soldered or welded so as to make the joints perfect, as at fig. 17. After this, the end may be compressed in the dies and punch, as shown and described in fig. 9; or the same effect may be produced by joining two pieces of the shape shown at fig. 18, and welding or soldering them together so as to make or form the unfinished top tip, as at fig. 19, from out of sheet metal, which is to be compressed at the end for the purpose of forming the complete top tip, as at fig. 13.

Having now described this improved mode, method, or process of manufacturing top tips, I wish it to be understood that I do not claim any peculiar kind of tools or presses to be used in the manufacture of the same, as these may be varied to suit different sizes or shapes; but what I claim, as this invention, and secured to me under the above in part recited Letters Patent, is the making or manufacturing of top tips from out of rolled or sheet metal in the manner, and after the method or process hereinbefore described, and particularly compressing the ends of such sheet metal top tips, so as to form them of the required shape for fitting into the notches in the wheel, without the necessity of any drilling, filing, cutting, or turning of the same, as is necessary in the old or ordinary mode of forming top tips out of solid metal.—[*Inrolled in the Rolls Chapel Office, May,* 1838.]

To Robert Whitfield, *of Hercules-buildings, Westminster-road, in the county of Surrey, gentleman, for a composition which he denominates an indelible, safety, and durable black fluid writing ink.*—[Sealed 14th November, 1837.]

This invention merely consists in combining a very long list of ingredients in different proportions, most of which

are highly combustible, and then setting them on fire by means of a red-hot iron rod, and collecting that portion of them which in the act of combustion would otherwise escape in the state of smoke, and become soot, and also collecting the residuum of the burning operation which is afterwards to be ground up into an impalpable powder, and when mixed with some liquid ingredients, hereafter named, will produce a fine indelible black ink, which the Patentee informs us cannot be extracted from paper, parchment, &c. by any acids or chemical processes whatever, without materially injuring the texture of the material subjected to such a process.

The principal ingredients employed by the Patentee in making the before-mentioned mixture to be subjected to combustion, are the following, and they are mixed or amalgamated in various proportions; viz. linseed oil, cocoa-nut oil, Venice turpentine, bullock's blood, loaf sugar, seed lac, gum arabic finely pounded, linseed and pounded cotton seed, finely pulverised charcoal, pomegranate peel, Aleppo nuts, gum kino, solution of India rubber, the very best molasses or treacle, parchment shavings, oacre seed, burnt horns, the best ivory black and Antwerp black, tartar Indian borax, cynaret of potash, a quantity of the best glue finely pounded, Arcadian nuts and walnut shells. These materials are intimately mixed together in a large iron vessel, and boiled for about ten minutes; the whole mixture is then set on fire by stirring it about with a red-hot iron, and allowed to burn till all the oil is consumed. The smoke arising from the combustion of this mixture is collected in a conical-shaped vessel, which is inverted over it; this vessel is to be made of the very best sheet iron; it will then be found that the smoke will become condensed, and deposit itself in the shape of soot on the

sides of the conical vessel; and when all the oil is consumed by the combustion, the product, or that which is found in the conical vessel, must be carefully collected, and put into jars; and that part of the ingredients which remains in the iron boiler or cauldron, and which will be found adhering to the sides of the vessel, must be scraped off, and ground upon a stone until it becomes an impalpable powder.

The products thus obtained must be mixed with some liquid materials in about the following proportions:—to one pound of the products above mentioned, add one quart of the very best French vinegar to about one gallon of hot water, a small quantity of finely-powdered gum arabic, and an equal quantity of gum lac; to these must be added a few Aleppo galls, and a small quantity of logwood chippings. The whole of this must be boiled for about ten minutes in an iron vessel, and then be poured out into shallow iron vessels, and be allowed to remain for three weeks exposed to the atmosphere.

The Patentee says, in conclusion, "I do not mean or intend to claim the exclusive use of any of the materials herein set forth, nor do I intend to confine myself to the exact proportions of combining them, as the same may be beneficially varied; but what I claim as my invention, is the producing an indelible black ink from the products above named, or from the greater proportion of them combined with the liquid ingredients, as above described."—[*Inrolled in the Inrolment Office, May,* 1838.]

To ROBERT GRIFFITHS, *of Smethwick, near Birmingham, in the county of Warwick, machine-maker, and* SAMUEL EVERS, *of Cradley Iron-works, in the county of Stafford, iron-manufacturer, for their invention of improvements in the manufacture of burrs or nuts for screws.*—[Sealed 11th January, 1838.]

THIS invention consists of a certain arrangement of machinery for manufacturing bars of iron in such a manner that they may be readily cut up or divided into blanks of the required form, for making six-sided nuts or burrs. That part of the machinery which gives the bars of iron or other metal the required form, consists in the adaptation of a pair of peculiarly-formed rotary dies or indented rollers, which, as they revolve, the bar of iron being passed between in a heated state, make the necessary indentations; so that after the bar of iron has been passed through the machine, it will only be necessary to cut the said bar transversely through, and a six-sided blank is found ready to be drilled and tapped to make it into a burr or nut. But in order that the invention may be better understood, we have shown in the accompanying drawings in Plate VII., at fig. 21, a side view of a pair of the dies, with a bar of iron being passed between them; and fig. 22, represents part of a bar of iron after it has been through the dies or indented rollers, and drawn upon a larger scale; the transverse dotted lines in the last mentioned figure, represent that part of the bar which must be cut through to form the blank of the required form.

In the old manner of manufacturing burrs or nuts, a piece of plate iron was bent round a mandril, thus leaving a hole in the centre, which must afterwards be tapped with the proper instrument; and the joint occasioned by the termination of the piece of plate-iron was welded, thus causing a considerable outlay of labour, time, and expense, which this invention will effectually do away with.

The Patentees here state, that they prefer passing the bar of iron through the machine directly that it has been formed into a bar in the previous operation, and while it is in its heated state, so as to render the operation of reheating unnecessary, and by this means economising fuel.

The Patentees say, in conclusion, "Having now described our invention, and the manner in which the same is to be performed, we wish it to be understood that what we claim as our invention, is the manufacturing or producing of bars of iron, having their sides formed into a series of angles, such bars when cut up by transverse cuts being blanks for six-sided burrsor nuts, as above described."—[*Inrolled in the Inrolment Office, June*, 1837.]

To MANOAH BOWER, *of Birmingham, in the county of Warwick, for his invention of improvements applicable to various descriptions of carriages.*—[Sealed 7th June, 1836.]

THIS invention consists of improvements in the construction of the folding head or cover of carriages, which, according to the method now employed in constructing them, are, when folded down and out of use, very much in the way, and are very unsightly and of considerable weight, and thus occasion much inconvenience; but according to the method employed by the Patentee in carrying out his invention, the folding head or cover is, when folded down and out of use, completely hidden from sight, and is boxed up in the interior of the carriage; and at the same time it combines lightness and elegance with considerable strength and durability, and may be raised and lowered with the greatest facility.

Plate VII., fig. 20, represents a side view of a chaise complete, the folding cover or head being represented in section,

the better to show the construction of the same; *a*, *a*, is that part of the body of the chaise, which is intended to receive the folding head or cover when it may be necessary to fold it down; *b*, *b*, are hollow standards shown by dots in the drawing, and are for the purpose of guiding the supporting rods *c*, *c*, to the top of which rods a flat plate *d*, is attached; *e*, *e*, is the front part or framing of the folding head, and *f*, *f*, are wire stretchers for the purpose of keeping the folding head distended and in its proper place, the fulcrum of these wire stretchers being in the box or double plate *g*, which is attached to the front part *a*, and one of the supporting rods *c*; *h*, *h*, are springs on the supporting rods *c*, *c*, we suppose, for the purpose of steadying them, and preventing them from shaking about when the folding head is down, and the said rods are in the hollow standards *b*, *b*. The folding head is opened, and kept so by means of the common-hinged joint *i*; one end of which is attached to the front framing, and the other end to the plate *a*. It will now be seen that when the folding head is lowered, it will be closed in a similar way to a lady's fan, and be contained in the box or part *a*, of the body, and the whole is hid from view, the front framing or part *e*, *e*, being padded in the ordinary manner of padding chaises, so that it may answer the purpose of padding commonly placed round the top rail of chaises.

The Patentee says, in conclusion, "I would remark, that I lay no claim to the various parts separately, nor do I confine myself to the precise combination, as slight variations may be advantageously made, without departing from my invention."—[*Inrolled in the Inrolment Office, December*, 1836.]

To GEORGE HOUGHTON, *of High Holborn, in the county of Middlesex, glass-merchant, for a certain improvement or certain improvements in the construction of lamps, being a communication from a foreigner residing abroad.*—[Sealed 21st December, 1836.]

THIS invention consists of an improvement applicable to lamps, in which the oil or other inflammable matter intended to be burned, is contained in a reservoir or chamber at the lower end of the column, and is intended to be forced up therefrom to the burner, by a force pressing a piston on the surface of the oil or other inflammable matter contained in such reservoir or chamber; and the said improvement consists in the application to such lamps of a regulator, adapted to occupy a part of the channel destined for the passage of the oil or other inflammable matter in ascending from the reservoir to the burner, the extent of the part of such channel so occupied being varied continually by the motion of the piston in such manner, that a resistance to the motion of the piston is produced by means of the said regulator, commencing at a given point of intensity, adjustable as hereinafter described, and constantly diminishing while the piston is in operation.

For the more complete explanation of the said improvement, I have hereunto annexed a sheet of drawings, representing a mode of applying the same to a lamp in which oil is to be used, and in which the force used to press on the piston is a spiral spring.

Fig. 1, Plate VIII., is the section of the lower part of a lamp, and figs. 3, to 10, represent parts detached: A, A, is the oil chamber at the lower end of the column, made of tin or other suitable metal; it is cylindrical, and should be made tolerably true inside, to allow the circular piston B, B, to work up and down in it freely, but, at the same time, oil-

tight: E, is a tube fastened to the piston by a pair of nuts *d, d,* which I shall call the tubular piston rod, from its occupying the position of a piston rod, although it does not, in fact, perform the ordinary function of a piston rod, but serves as an ascent pipe for the ascent of the oil from the oil reservoir. The piston is formed of two thin disks or circular plates of metal, see fig. 1, between which is enclosed a circular cup-leather, see figs. 1, and 3, such as is used sometimes for the packing pistons or buckets of pumps; but the turn-down edges or sides of the said cup-leather *e,* are made of a considerable depth, and at the upper part close to the plates of a less diameter than the diameter of the oil chamber; and after the cup is made in the usual way it is put in a lathe, and the edges turned conical or tapering, as shown in fig. 1, in order to give them great flexibility or compressibility, for the purpose hereinafter pointed out: J, J, figs. 1, and 4, is the regulator; it is a thin rod inserted through the upper end, and passing down the middle of a tube H, H, to the lower end of such tube; the upper end of the tube H, is soldered to two upright legs *a, a,* see figs. 1, and 4, rising from a cylindrical nosle *b,* (which is like the nosle of a candlestick,) and near to the lower end of the said tube H, is soldered, by thin ribs, a short piece of tube *c.* The nosle *b,* drops, and fits tight into the aperture at the upper end of the column D, see fig. 1; and the tube *c,* fits also closely into the interior of the column. The piece of tube *c,* is merely for the purpose of keeping the tube H, steady in the centre of the column; and when the nosle *b,* tube H, and its steadying tube *c,* are in their places, as shown in fig. 1, in the column, they form, as it were, a fixture therewith, and are intended to remain so while the lamp is in operation, though the whole can be drawn out (as shown in fig. 4,) to be cleaned or repaired. The tube H, is the fixed ascent pipe, through which the oil passes from the

tubular piston rod up to the burner, as will be hereinafter more minutely explained. The regulator J, is not immoveably fixed into the upper end of the tube H, but is attached thereto in such manner as to allow of regulating how far it shall pass down the tube H. This adjustment is effected by passing the regulator through a leather socket 1, see fig. 1, screwed or otherwise firmly inserted in the upper end of the tube H, the regulator fitting so tightly into such socket 1, as to be quite oil-tight, and so as not to move therein, unless forcibly drawn up or pushed down. The object of this arrangement is, to be able to adjust the length of the operating part of the regulator by raising or lowering it in its socket.

The tubular piston rod E, passes, as will be seen, by fig. 1, over or outside of the regulator rod, and inside of the tube H. The external diameter of the said piston rod is such, as to fit into the tube H, as nearly as possible oil-tight; and to insure a perfectly oil-tight fitting, a small piece of leather or cloth, or other packing, is wound round the piston rod at 2, see figs. 1, and 3, or may be put into the tube H; and the internal diameter of the said piston rod is a little greater than the thickness or diameter of the regulator rod, see figs. 1, 3, and 4, so that a great part of the internal area of the tubular piston rod is occupied by the regulator rod, leaving a very narrow space around the said rod for the passage of the oil through the piston rod. To the upright leg *a*, at the top of the column D, a small brass box *f*, see fig. 1, is fixed, adapted to receive and guide a rack *o*, which is firmly fixed to the piston by the side of the piston rod, see figs. 1, and 3; and the said box receives also a small pinion *n*, shown in fig. 1, which works in the rack *o*, for raising and lowering the piston, being turned by a key *p*, which fits on its axis.

The burner is of the common kind called an Argand

burner, consisting of an external and internal tube m, and n, see fig. 1, leaving an annular space between them, to receive the wick and the carrier tube on which it is fastened: F, is the spring, which is the moving force employed to press on the piston, and force up the oil from the oil chamber to the burner. In the drawing I have represented a spiral spring made of iron wire of about five thirty-secondth parts of an inch in diameter, such as is used for the spring cushions of chairs and sofas. Note, the spring F, is represented as a continuous wire, coiled into three cones instead of two, of which such ordinary spiral springs as aforesaid are composed; and I sometimes use spiral springs of a continuous wire coiled into four cones, in order to obtain a greater degree of flexibility combined with the proper degree of elastic force; such springs are, however, whether composed of three or four cones, made by the same means as the common spiral springs consisting of two cones, namely, by winding the wire round a mandril composed of the requisite number of conical blocks of wood fitted on a common axis; only in taking out the said conical blocks of wood when the spring is finished, it will be requisite, of course, when the spiral spring is to consist of three or of four cones, to bend open the spring in order to draw out such of the conical pieces of wood of the mandril as require to be taken out, with the small end foremost; and the spring must afterwards be set true again.

The principal parts of the lamp being now pointed out, I will explain its operation:—Suppose the lamp to be empty, the piston will be at the bottom of the chamber A; the spring F, will be uncoiled (as far as the length of the oil chamber will allow), and the upper end of the tubular piston rod nearly down to the lower ends of the tube H, and of the regulator rod J. Now, to fill the lamp, oil is poured in at the nosle b, and flowing down in the column

As fast as the spring uncoils itself, and, consequently, acts with less and less force, the piston descends, and the tubular piston rod is drawn more and more off the regulator rod; see fig. 1, which represents the piston partly descended in the oil chamber.

By this means, although the force of the spring is continually diminishing, while the height of the column of oil which it has to lift is continually increasing, yet the delivery of oil to the burner may be kept (by duly proportioning the thickness and length of the regulator rod) nearly equal at every point of the descent of the piston. Note, I have represented and described the regulator rod as a rod of equal thickness throughout its length; it may sometimes, however, be found necessary to make it very slightly tapering or conical, but this will only be when the spring acts with an inequality, proceeding in a more rapid ratio than can be compensated for by the friction of the oil in a passage of uniform area, though of varying length. In such cases, a very slight taper may be given with advantage to the regulator rod, the effect of which will be to continually vary, during the descent of the piston, the area of the aperture through which the oil passes into the ascent tube H, as well as to vary the resistance to the passage of the oil caused by friction; but whenever the spring is so made as to act regularly, a regulator rod of equal thickness throughout will be best.

The oil passes up from the upper end of the tube H, through a short neck 4, in the leg *a* 1, see fig. 1, which is hollow, and communicates with the annular space between the burner tubes containing the wick. The small tube *q*, which carries the wick, shown detached in figs. 6, and 7, is represented in the drawing as raised and lowered by means of a rack *r*, and pinion *s*, the rack *r*, being fastened to the said carrier tube *q*, and received and guided in the

hollow of the leg *a* 1, see fig. 1; and the pinion *s*, being fitted on a short axis passing through a socket soldered to the outer burner tube, and turned round by a key *t*, see fig. 1: *u*, *u*, are little toothed springs, fastened to the carrier tube *q*, to hold the cotton wick fast against it when the carrier tube is between the two tubes of the burner; *v*, is the chimney, standing in a short double tube *w*, which can be slided up and down on the outer burner tube M, see fig. 1, to increase or decrease the length of the chimney; but the wick may, if it be thought more convenient, be raised and lowered in the manner practised in the Argand burners in common use, as shown in fig. 10. Note, the waste or excess of oil flows down the inside of the inner burner tube *m*, and also outside of the outer burner tube, through the waste gutter 8, see figs. 1, and 3, and drops down through the column into the oil chamber upon the surface of the piston; and when the lamp has been burning some time, the waste oil may be caused to pass below the piston by giving the pinion *n*, a few turns, in order that such waste oil may be again raised up to the burner.

The length of the tubular piston rod, which should be occupied by the regulator rod, at the commencement of the descent of the piston, and the area which should be left between the regulator rod and the tubular piston rod, in order to produce the requisite degree of friction to regulate the passage of the oil, and the degree of taper (when any is given) of the regulator rod must, it is obvious, be fixed in each lamp, with reference to the strength and regularity of action of the spring, and the degree of viscidity of the oil burned; nor can any precise rules or dimensions be laid down for the relative sizes of the regulator rod and the piston rod. I will, however, observe by way of general direction, for the construction of lamps to which this improvement is to be applied, that as regards the elastic force

of the spring, it should be such as to exert, when the piston has reached the utmost extent of its motion, a pressure, exceeding by about a pound, or a little more, the weight of the whole column of oil, which it then supports; and that as regards the proper proportions for the regulator and the tubular piston rod, they will be found, by attending to the following direction, that when a lamp of ordinary size, intended to burn from six to ten hours, with such oil as is ordinarily used for table lamps is burning, there should be about from five to twenty drops per minute of waste oil delivered from the waste gutter 8. The amount of resistance to the passage of the oil, and consequently the quantity of waste oil will be finally regulated by drawing up or pushing down the regulator more or less. This regulation must be left to the direction of the person making or using the lamp, having regard to the viscidity of the oil or other inflammable matter used.

Having now described the nature and mode of applying the said improvement to the construction of lamps, I do hereby declare, that, under the said Letters Patent granted to me as aforesaid, I claim only the application of a regulator to lamps in which the oil or other inflammable matter is intended to be forced up to the burner by means of a piston pressed against the surface of the said oil or other inflammable matter, such regulator being adapted to operate in the manner which I have described, that is to say, in combination with, and by means of, the motion of such piston, so as to occupy a continually decreasing space in the channel or passage through which the oil or other inflammable matter is forced from the reservoir, and thus oppose a continually decreasing resistance to the passage thereof. And as to the spring, the piston, with its cup-leather, the rack, and all other parts of the lamp, the same have been described by me merely in order to show how

the regulator aforesaid may be most advantageously applied to a lamp, acting by means of a spring and piston. And, I do not claim an exclusive right to such parts, or any of them, as the same are or may be already known and in use in lamps.—[*Inrolled in the Rolls Chapel Office, June, 1837.*]

To Theophilus John Nash, *of John-street, Devonshire-hill, in the parish of Hampstead, in the county of Middlesex, letter-maker, and* John Ross, *of Wyld-street, Lincoln's Inn-fields, in the said county of Middlesex, brass-worker, for their invention of a method of manufacturing in metals, wood, and other substances and materials, letters, figures, and other devices, having a flat surface, presenting by the aid of colours the appearance of projection; and domed letters, figures, and other devices, made from the same materials, without seam or join.*—[Sealed 19th June, 1837.]

These invention of a method of manufacturing in metals, wood, and other substances and materials, letters, figures, and other devices, having a flat surface, and presenting by the aid of colours the appearance of a projection, will be found useful and superior to the old projecting letter, figure, or device, in the following respects:—The flat letter, figure, or device, having an appearance of a projection, may be applied in decorations, in showing names and trades on shop fronts, names on doors, sign posts, numbers on pews in churches, tickets in shop windows, names and ornaments on ship's sterns, and to all the purposes where letter painting can be required, and will be more useful than a mere painting, as the articles made under this invention can be removed from a substance on which they may be placed, and applied to other purposes; an advan-

tage that a mere painting does not possess. The flat letter, figure, or device, is much lighter, and more portable than the actually projecting letter, figure, or device. The flat letter, figure, or device, can be used for purposes in which the actually projecting letter, figure, or device would be inconvenient, such as tickets for goods, windows, tablets, &c. &c. The flat letter, figure, or device, will not accumulate dust or dirt to the same extent as the actually projecting letter, figure, or device, and may be more easily cleaned and kept in order. The invention of a method of manufacturing domed letters, figures, and other devices in metals, wood, and other substances and materials without a seam or joint, will be found useful for the purposes mentioned, with respect to the letters, figures, or devices, with a flat surface having the appearance of a projection, and will be found superior to the old domed letters in the following particulars:—The domed letter, figure, or device, without seam or joint, will be more durable than the old domed letter, figure, or device, as the latter is very liable to corrode and become unfastened at the points where the seams or joints were, in consequence of the action of damp, &c., at those particular places. Both the domed and flat shaded letters, figures, and devices, when made into metal and japanned, according to the directions hereinafter given, can be used without injury in tropical climates.

To make the letters, figures, or devices with a flat surface, presenting with the aid of colours the appearance of a projection—Firstly, draw the outline of the letter, figure, or device, and cut out the same in tin, or any other metal or substance, and this will make the first pattern. Secondly, take the pattern and place it flat on a sheet of tin, or any other metal, and by drawing any sharp instrument round the edges of the pattern, you get the outline marked on the surface of your material; see diagram marked A, in

Plate VIII. Thirdly, draw a line at the bottom of the outline, at the same distance that you require apparent projection. If, for instance, you wish the letter, figure, or device to appear to project one inch, the line must be drawn one inch from the bottom; see line marked B. If it is wished that the shade should appear to fall to the right of the letter, the line will commence one inch from the left side. If the shadow is wished to appear to fall to the left side, the rule must be reversed, see diagram A, and line B. Fourthly, shift the pattern to the line drawn and marked B, and then mark with a sharp instrument, carried along those edges of the pattern that come beyond the outline lines, meeting those of the right side of the outline; then remove the pattern, and carry lines according to the rules of perspective, to connect the edges of the lines drawn round the edges of the shifted pattern with those of the outline, and form such points as may be required to complete the projecting appearance, (shown by dotted lines in diagram D,) and the pattern of a letter, figure, or device, with a flat surface, and an apparent projection, is complete. Diagram C, shows the situation of the first pattern when shifted; and diagram D, the pattern of the figure given after the lines drawn round the edges of the shifted pattern, as above described. This pattern D, is placed on tin, or any other material on which the article is intended to be produced, and the outline marked in the manner mentioned in the second direction; the form of the pattern is then left on the surface of the material, and when cut out, the article in outline is produced.

To produce a letter, figure, or device with a flat surface, having the appearance of a back shadow as well as a side shadow, as above shown, the following process must be gone through:—First draw the outline (as in the second

direction of the second pattern; see diagram E; then draw a line at the bottom, at such distance from the outline as apparent shadow may be required, commencing at the same distance to the left of the extreme outline of the pattern; *vide* line marked F, under last diagram; then place the first pattern, marked A, on the line drawn, and with a sharp instrument, as before, draw round the edges of the first pattern extending beyond the left edges of the outline, until the edges touch the edges of the outline; then remove the first pattern, and complete the outline by drawing lines to connect the edges of the pattern and the outline, as before shown by dotted lines, (see diagram H,) and the outline of a flat figure is produced, showing an apparent side and back shadow, or the appearance of projection. Diagram G, shows the situation of the first pattern on the second diagram; H, the outline of the third pattern complete.

This pattern H, is placed on tin, or any other material in which the article is intended to be produced, and the outline marked in the manner mentioned in the second direction; the form of the pattern is then left on the surface of the material, and when cut out, the article in outline is produced. Pieces of tin, or whatever metal or material the article is intended to be made with, are then cut out according to the pattern required, flattened and primed for painting with colours used in japanning. The first pattern is then placed with its top line, or top boundary, on the top line or top boundary of the pattern intended to be painted, and the outline drawn as in the second directions; from this outline, all other lines necessary to give the projecting appearance can be drawn. The article is then painted in shadow, with colours used in japanning, or gilt on japanning gold size, so as to give the projecting appearance. The article is then put into a japanner's stove, and subjected to

the usual process adopted in the art of japanning. The article is subsequently polished in the usual way of japan-polishing, and is then complete.

To manufacture domed letters in metal, wood, or other materials, without seam or joint, make a male and female die according to the pattern required; insert the metal, wood, or other material between the two dies, and press with a hand-screw, or by other means, and the form of the article required will be obtained. It is then painted and japanned according to the plan before mentioned, as adopted with respect to the letters, figures, or devices, having a flat surface. If wood be used, it must be thin and pliable. The outlines of the flat letters, figures, or devices, having a projecting appearance, may be obtained by perspective drawings, made without any other assistance than the ordinary rules of perspective; but it is found that the process above described is that which attains the object required in the readiest manner.—[*Inrolled in the Petty Bag Office, August*, 1836.]

To WEBSTER FLOCKTON, *of the Spa-road, Bermondsey, in the county of Surrey, turpentine and tar distiller, for his invention of certain improvements in preserving timber.*—[Sealed 3d August, 1836.]

THE method of preserving timber specified by the Patentee, consists in impregnating the timber to be preserved with a metallic solution, which is prepared and applied in the following manner: about four hundred gallons of Archangel or American tar is put into a pitch still, and distilled until all the essential oil is extracted from it, when it becomes pitch. Two barrels are then prepared, and placed side by side, and a quantity of the essential oil is poured into them,

we suppose one of them, until it becomes about three-fourths filled; then a quantity of very much rusted iron and tin cuttings is put into the barrels, and the essential oil must be pumped from one barrel to the other every day for about six weeks, when the oil will be found to have become very black, and its specific gravity much increased, and the iron and tin cuttings will have become quite bright. The iron and tin cuttings must then be taken out and piled into a heap, to be re-oxydised; and it will be found that this operation will be considerably accelerated by the addition of a solution of common salt and water; and when the above materials have become re-oxydised, they will be again fit for use.

The manner in which the metallic solution is applied, is described in the following manner:—If it be desired to apply the metallic solution to piles already standing, such as those used in the construction of piers and jetties, a hole must be bored with a one-inch auger, right down the centre of the pier to the lower end, or as far as it can conveniently be bored, and a quantity of the metallic solution is then to be poured into the hole until it is filled.

The Patentee has not informed us how often this is to be done, but says that it will depend entirely upon circumstances: when the solution is poured in, the hole must be stopped up with a wooden peg or trenail, which can be easily opened again with an auger, if thought desirable to add more of the solution; but in the course of two or three days it will be seen oozing out of the pores of the wood, and incrusting the surface of the pile with metal.

If it be desired to apply the metallic solution to the exterior of wooden buildings, then it is applied with a brush, in the same manner as pitch and tar, for it is perfectly liquid, and penetrates very quickly, and becomes entirely hard and dry in the space of six or eight hours; and if any

part of the timber is affected with dry rot, it not only effectually stops it, but also restores the injured part.

The solution is applied to the timber used in the construction of railways, in the same manner as it is applied to the piles and other parts of piers and jetties.

The Patentee says, in conclusion, that what he claims as his invention, is the application of a metallic solution, such as above described, to the preservation of timber, and which timber will be found to be effectually preserved from the action either of water or the dry rot, or the worm.—[*Inrolled in the Inrolment Office, February,* 1837.]

ORIGINAL COMMUNICATION.

ON JOYCE'S HEATING APPARATUS.

(*To the Editor of the London Journal of Arts.*)

Sir,—As in England, so also on the continent, has the extraordinary invention of Mr. Joyce excited very general attention and lively interest, but not without drawing forth much contrariety of opinion as to its merits and efficacy, even from among experimental philosophers.

The opinions of Mr. Gay Lussac (who, we must admit, stands foremost in the walks of chemical science,) though by no means conclusive or satisfactory, have been widely circulated; not as I conceive so much from the simple desire of communicating important truths in physical science, as from a feeling of jealousy on the part of the old students against a bold untutored genius who has dared to assert the fact of an effect obtained from certain chemical action, which is contrary to those theories and preconceived notions which the schools have long considered to be indisputable.

I am not prepared to deny that opinions opposed to this invention *may* be founded upon an immoveable basis in science, but I am so much of a sceptic as to withhold my acquiescence to the

opposing doctrine until I find, from a series of fair, accurate, and minute experiments, that the assertions of Mr. Joyce (which are certainly borne out to a great extent by our senses) are really fallacious, unsound in their philosophical principles, and undeserving of further consideration.

With these views, I beg to forward to you an accurate translation of Mr. Gay Lussac's report upon this subject, accompanied by a counter report, deduced from a careful investigation of the subject by another eminent chemist, who has experimented on the patent fuel and stove, which I extract from the *L'Europe Industrielle* of the 16th instant.

NOTICE READ BY MR. GAY LUSSAC, AT THE ROYAL ACADEMY OF SCIENCES, ON A NEW METHOD OF HEATING APARTMENTS, IMPORTED FROM ENGLAND.

Much has been said about this process, as being a marvellous invention, by means of which an immense room may be warmed with fifty to sixty centimes worth (five pence) of charcoal, and besides maintain therein an agreeable temperature during twenty-four hours. It was also pretended that the carbonic acid resulting from the combustion is not spread in the apartment, but that it is retained or neutralised by the carbonate of soda with which the charcoal had previously been impregnated, and thus respiration will not be impeded; and persons remaining in the same room with it have nothing to fear. In fine, that it may be adapted with confidence, as it already had received the approbation of scientific men in England. The process has also been submitted to the Academy of Sciences.

This boasted discovery seemed to deserve my serious attention. I, therefore, undertook to make the results of my examination known to the public and to the importers, whom I should think would be interested in knowing the advantages as well as the disadvantages of this system of warming; and, moreover, I believe thereby to do my duty.

The material employed is charcoal of very light wood, impregnated, it is said, with carbonate of soda, to retain or neutralise the carbonic acid. I have an authentic sample of this coal,

and, in fact, I have found that it contained carbonate of soda, or rather carbonate of potass; but the quantity of it is very small, not even a fourth thousandth part of the weight of the coal, and thus it burns very briskly, like all light wood coal.

It thus appears evidently that the burning of this charcoal must spread into the room the same quantity of carbonic acid as a like weight of any other coal, that it vitiates the air in the same manner, and thus causes the same accidents; and it is no less evident that this prepared charcoal does not produce or give off a greater quantity of caloric than common charcoal, as with the same weight it contains no more combustible material. But having attended an experiment on the combustion of the new coal, I found, along with other gentlemen, that the combustion of it had no noxious smell, which made me think that the small portion of alkaline salt which had been added, might be the cause of the absence of any odour or scent. This certainly would have been an actual improvement in the process of domestic heating apartments, and a true discovery. It was easy to submit this supposition to the test of experiment.

I have now discovered that common charcoal is nearly as much alkaline as the prepared coal employed in the new process; but to make the experiment the more conclusive, I impregnated the common coal with water slightly charged with carbonate of soda, and in such a manner as it seemed to be more alkaline than the English coal, and afterwards I dried it again on a stove. Two furnaces being lighted, the one with prepared coal, and the other with natural coal, I perceived no sensible difference as to any smell; and several other experiments, varying in the proportions of carbonate of soda, gave the same results.

By being thus convinced that this salt had no influence on the combustion of the charcoal, I was brought to think that the absence of any smell which I had observed in the English coal was inherent to its nature, as it is known that for use in brasiers, all sorts of coal may be burnt with indifference; and thinking that the English coal might, perhaps, be of fir tree, I caused some fuel to be made of some old deal boards. The coal obtained there-

from was very light, and it was found to be sensibly more alkaline than the English coal; and being burnt with common coal, it was found to be less obnoxious, and seemed to be equal to the English charcoal; but I was not able to make an exact comparison, because I had not a sufficient quantity of the latter.

The importers of the new system of heating, burn their charcoal fuel in an elegant apparatus, it is a true brasier, dispensing all the caloric into the apartment in which it is placed. It is in this apparatus that the great economy of fuel consists. There is no contesting it, as it is well known; but it must not be forgotten that this economy is obtained through vitiating the air in the room, and exposing the lungs of persons within the room to its effluvia, and particularly so with unexperienced people, abandoning themselves to blind security.

However, our observations are by no means intended to proscribe the new system of heating apartments, but rather to cause it to be better appreciated than it has been, and to bring it to its true value. These observations suggest to us, first, that the fuel is only a light wood charcoal well prepared, containing more alkali than what is naturally found therein; secondly, that this fuel yields no more caloric than any other sort of charcoal; thirdly, that the mode of heating employed, which is to dispense all the produce of its combustion into the apartment, really presents an economy on other modes, but it is only by vitiating the air and rendering it dangerous for respiration; fourthly, that a well-constructed stove, taking the atmospheric air out of the apartment, can yield nine-tenths of its heat produced without vitiating the air, nor cause any bad smell, or effect the respiration; and that the use of such a stove is less dangerous, and almost as economical.

COUNTER-OPINION OF M. PILAY, ON THE EFFICACY OF THE IMPROVED FUEL AND STOVE, EXTRACTED FROM "L'EUROPE INDUSTRIELLE," MAY 16TH.

"Our readers, no doubt, recollect that some time since we presented them with an account of a new process of heating apart-

ments, imported from England, and which offered an immense economy on all other methods. They will not have forgotten the notice of Mr. Gay Lussac on the new process. It is this notice which has excited the attention of M. Pilay, manufacturer of acids and pyroligneous products, and has thus caused the following letter:—

"Since Mr. Gay Lussac's report on a certain prepared charcoal in England, and which, according to the inventors, was to produce quite marvellous effects, I have endeavoured to pay all possible attention to such an important invention, and see if there were no means of avoiding the inconveniences that the report pointed out, viz. the vitiating the air in the apartment, and also if it would not be possible to substantiate an invention which promises to be so highly useful in domestic economy, when the fuel is freed from the deleterious emanations it contains.

"Having obtained some results, I take the liberty of submitting to the Academy (Brussels) the experiments by which I have arrived at those results.

"1st. That common charcoal is essentially different from the proposed prepared charcoal.

"2d. That the first (common coal) contains organic substances, the decomposition of which, by the combustion, yields an empyromatic oil and a great quantity of gas (hydrogene carbonic).

"3d. That this oil and gas have, in themselves, a greater and more dangerous tendency to affect the health than pure carbonic acid.

"4th. That if the charcoal is well calcined or burnt it has no smell, as Mr. Thenard justly observes, because in that state it is freed from the organic substances which produce the above-mentioned oil and gas.

"5th. That the addition of carbonate of soda is by no means requisite nor useful in the preparation of the new coal, because the salt is charged with the quantity of carbonic acid as much as it can contain when in full red heat ignition.

"6th. That, however, the sub-carbonate of soda, or rather

[illegible] is no less useful in the preparation of that coal, in [illegible] to disengage foreign matters from the body of [illegible].

"7th. That it is possible to add to the soda a certain salt, which, even by increasing the combustion, may actually absorb a [illegible] portion of the carbonic acid.

"8th. That the charcoal thus prepared is no longer susceptible, like the common charcoal, of absorbing from fifteen to seventeen times its volume of the gas which exists in the warehouses, &c. where the coals generally are deposited or stored.

"9th. That it is to the presence of these gases to which may be partly attributed the difference existing in the charcoal burnt in the neighbourhood of Paris, and that coming by water from distant forests.

"10th. In fine, it is possible to obtain, without the loss of even the twentieth part of caloric, all the heat produced by a given quantity of coal, and it even may be dispensed without the loss of even one-twentieth part of the caloric, an aperture may be left to emit the carbonic acid.

"From these experiments I am convinced that the proposed mode of heating, if slightly improved, may be used without the least inconvenience. It is with this view that I now offer to prepare the charcoal, and an apparatus which will make this mode of heating very useful.

"I may observe, that in pursuit of this object, I have endeavoured to follow the laws of chemistry, to arrive at domestic economy in the most extensive application of the word. I am convinced, that I have not deviated from the fundamental principles of chemistry, and I solicit a report from the Academy."

M. Pilay, doubtless, will be more explicit with the commission of the Academy, because we do not see how they can make a report on his communication as we have given it above.

We take this opportunity to add the claim of Mr. John Marshall, the purchaser of the Belgic patent, granted to Mr. Joyce, in answer to the notice of Mr. Gay Lussac.

Mr. John Marshall, after having affirmed that Mr. Gay Lussac

had only made a very superficial examination of the process of Mr. Joyce, and that the process still was unknown; and also that it had all the promised advantages, and none of the pretended inconveniences set forth by the sapient academician, expressed himself as follows:—

1st. I affirm that the quality of the fuel departs in no respect from the nature of charcoal. All sorts of charcoal may be employed; and far from it being requisite to use light wood coal only as it is said in the report, the preference is given to the hardest and heaviest woods. The fuel is submitted to a particular preparation, in which the employments of the alkalies made use of by Mr. Gay Lussac, are mere attempts at finding out the real invention, but which have no analogy with the process of the inventor.

2d. That in the manner of arranging the apparatus, which was not mentioned in the report, and which is not known to Mr. Gay Lussac, the combustion of the fuel throws out more heat into the room, and with more economy than coal burnt in brasiers.

3d. That the many experiments which have been made have proved, to great numbers of persons, that the products of the combustion are spread in the apartment without vitiating the air, and without impediment to respiration.

4th. That an apparatus charged with prepared coal presents all the desirable qualifications of a good and well-combined stove, and with more economy than any other. It yields, moreover, the desirable advantages of being portable, and does not want a chimney, as it gives out neither smoke, dust, nor smell into the room.

A regular series of experiments will shortly be made in an authentic manner, the results of which the public will be duly informed.

CHARLES ALBERT.

Strasbourg, May 20th, 1838.

NOVEL INVENTION.

IMPROVED MODE OF COVERING THE ROOFS OF HOUSES.

A NOVEL, cheap, and very effective coating for the roofs of houses has lately been introduced in Prussia, and has already become extensively employed in Berlin and its neighbourhood. It is said to be the invention of a gentleman named Dorn, a resident of that city.

The principal materials of which these coatings are made is coal tar, mixed with cinders, which is laid on in a plastic state, and when hard becomes perfectly firm and strong. The several roofs which we have inspected do not appear to have been in the slightest degree disturbed, cracked, or in any way injured by the extremes of heat and cold to which they must necessarily have been exposed during the two last summers and winters. We feel great confidence in recommending the adoption of this invention, as perfectly secure for covering very flat roofs, and in all situations where copper, lead, or zinc sheeting has been heretofore used, as we are informed that the composition remains for a very great length of time perfectly water tight, and is also incombustible.

The mode of preparing the roof is this:—upon the rafters attach strong laths placed close together, and upon these spread a layer of about half an inch thick of loam or clay, mixed with a quantity of spent bark from an exhausted tan pit. When this layer of earthy matter has become dry, coat it with a quantity of liquid coal tar sufficient to saturate the previous materials; then take coal tar mixed with pitch, and spread it evenly over the roof, and strew this while soft with the dust of cinder ashes, or sand, or brickdust, as much as the tar will absorb. This last operation of spreading a coating of tar and pitch with cinders, brickdust, or sand, may be required to be repeated two or three times, and the roof is then considered to be completed. In the same way the gutters may also be formed. Very little fall need

be given to these roofs, that is, not more than about an inch in a foot, as there will be no joints or elevation on the surface to impede the descent of water.

It is said that cracks scarcely ever occur in these tar roofs, from any circumstance whatever; but if they should happen, either from walking or passing heavy weights over the surface, from extreme variation of temperature, or from any other cause, the defect may be readily repaired by spreading a fresh coating of the tar and cinders upon the old roof, and it will become as sound as at first.

We are aware that a composition something like the above has been employed in England for some years past for the coating of terraces—for instance, on Margate pier; but that coating seems to be considerably affected by the heat of the sun; the above is not so, probably from the non-conducting property of the cinders. At all events, we are not aware that such modes of covering roofs have been used, at least to any extent in England, as they certainly are, and with the most satisfactory results, in Berlin.

SCIENTIFIC NOTICES.

REPORT OF TRANSACTIONS OF THE INSTITUTION OF CIVIL ENGINEERS.

The council, to whom has been confided, during the last year, the management of the affairs of the institution, being called upon, at the return of this the annual general meeting, to resign their trust, and to report on the state of the institution, solicit the attention of this meeting to the following report on their proceedings, and on the state and prospects of the institution at the close of the nineteenth year of its existence. And in the commencement of this report, the council cannot omit to express their satisfaction at the manner in which their efforts have been responded to by the general body, and it is peculiarly gratifying to them to be able to present a report which they believe will not

be inferior in interest to that which has been presented on any previous occasion.

During the past year the attention of the council has been directed to many important alterations, not only in the ordinary business of the institution, and in the introduction of such measures as may tend to the convenience of the general body, but also to changes affecting the constitution and permanent stability of the institution itself. It is known to most here present, that since the close of last session, the by-laws then in force have been abrogated, and a fresh code enacted.

Many here present are aware that certain propositions where, three years ago, submitted by Mr. Farey to a general meeting of members, and adopted unanimously. In conformity with the spirit of these resolutions, Mr. Farey, at the reqnest of the council and of the late president, subsequently drew up a very elaborate set of by-laws and regulations, which were, by a general meeting of members, referred to the council for their examination and report. The detail into which a desire to provide for any possible contingency, and to present a code of laws by which the body might be guided both in its infancy and maturer years, had led this distinguished member of your institution, rendered this a most difficult task for the council to perform, and the many important alterations therein suggested continued for a time in abeyance.

The attention of the council has, however, been continually recalled to them, as well by the approbation which these resolutions of the general meeting of members met with from all classes, as from the increasing number of applicants for admission, and the growing importance of the institution; and the council resolved to recommend a new set of by-laws and regulations. These, with some few alterations, were adopted by a general meeting of members, held on the 26th of last December, and are now, in conjunction with the charter, the laws of the institution.

The qualifications for admission into the class of associates were very ill-defined; the whole rising generation of engineers, or future members, being included in this class, it was thereby rendered devoid of the distinct character which it ought to possess.

The creation of a new class under the term graduates, as suggested by Mr. Farey, will, it is expected, afford the means of that classification which was so much to be desired. In this class will be enrolled those who, either as pupils or assistants to engineers, are qualifying themselves for the practice of the profession, and are attaining to that degree of experience and knowledge which, in the opinion of at least ten of the general body, with the concurrence of the council, will entitle them to be enrolled in the class of members.

The class of associates will, it is expected, in future consist of men of experience in pursuits connected with the practice and profession of the civil engineer. By the assistance and co-operation of this class, the bounds of knowledge in the infinite variety of subjects which come under the attention of the engineer may be extended, and thus that which the talents and resources of one could not attain, may be readily attained by the co-operation of many engaged in similar pursuits.

The existence of a class of honorary members, consisting of eminent engineers of foreign countries, and of others, illustrious for their attainments in science, and experience in matters connected with the profession of the engineer, enables the institution to connect itself with the names of those of every country who shed a lustre on the profession, or on science in general.

Thus it is conceived that the institution has been more adapted to the wants of the present generation; and as it was the wants of society which first called it into existence, so may it reasonably be expected that the continuance of those wants will keep it in a state of progressive improvement and adaptation. The nature of these wants, and the means by which they were in a great measure to be relieved, are, in the address of your vice-president, Mr. Palmer, to the meeting which called this institution into existence, set forth in the following manner:—

"It is a remarkable fact, that notwithstanding the extensive advancement of science, and the general increase of means for an acquaintance with it, tha il e the principles of systematic edu-

cation for most of the learned and scientific professions have been, and still are, actively encouraged, not even an attempt seems to have been made towards the formation of any special source of information or instruction for persons following, or intending to follow, the important profession of a civil engineer; in the practice of which the utmost skill of man is called forth, and which requires not only a knowledge of one leading branch of science, but many—not only of one leading art, but of an indefinite number, for the engineer, being a mediator betwixt the philosopher and the working mechanic, must, like an interpreter betwixt two foreigners, understand the language of both. If then we consider for a moment the continued application necessary to familiarise us with any one branch of art or science, surely any argument to enforce a persuasion of the utility of an institution to facilitate the qualification for a profession in which many branches of both art and science are necessary, must be superfluous." By such feelings were your vice-president and first members then actuated in forming the institution; and that these wants, then so urgently felt, have been in some measure supplied, no one can doubt who looks to the continued progress and present state of the institution. The attainment, in some measure, of the objects proposed, has kept the institution in a state of progressive improvement up to the present time, and the continued co-operation of all classes cannot fail of producing similar good effects in time to come. For by the opportunities here afforded, the more experienced in the profession may extend their knowledge by communicating with others equally experienced; the rising generation of engineers may communicate with each other, and receive instruction from the oracles of the profession, and acquire knowledge which conversation alone can give. Here, also, in the records of the institution, all may become acquainted with the opinions and the practice of the past and the present, and possess opportunities of consulting works and documents to be found in no other place. And when to these advantages are added that of meeting with men of eminence in collateral pursuits, as associates and honorary members, the council do con-

ceive that the spirit in which the institution was projected has been well followed out, and its good effects in some measure realised; and that the experienced engineer, no less than the student in the profession, possesses opportunities for which, twenty years ago, he would have sought in vain.

Much has at times been said respecting the establishment of a school of engineers, and many comparisons have been drawn betwixt the advantages possessed by this and other countries in this respect; but not for an instant to enter on the great question of the nature of a complete establishment under that name, it may, with confidence, be asserted that this institution is in itself a school of engineers; a school, not in the sense of the term where knowledge is forced upon the unwilling student, but one where the attentive student possesses remarkable opportunities for self-improvement by study and mutual intercourse.

Thus much have the council thought it right to state respecting the principles by which they were guided in changing the classes composing the institution; they now proceed to make a few observations on some other changes—and, first, with respect to the alteration in the admission fee and annual subscription. Those who now join the institution enter at once upon so many advantages which their predecessors did not possess, that an increased contribution may most reasonably be required of them. Such increase is, however, confined entirely to the class of members and associates. Those who join the institution as graduates will pay no admission fee until transferred to the class of members, and their annual subscriptions are as low as seemed compatible with securing sufficient funds for the wants of the institution. For it being conceived that those enrolled in this class will in general be young men, assistants to engineers, and not holding lucrative situations, or pupils in the office of an engineer, and not yet engaged in practice, it seemed consistent that such should be relieved as much as possible from the weight of the annual subscriptions.

The members, on the contrary, being generally engaged in active practice, and moreover the governing body under the

charter, it seemed right that the increase in the subscriptions should fall principally upon them; and, from the same considerations, the council are called upon to contribute in a still larger amount. But since cases will arise in which, from various causes, the annual subscription may be necessarily but unwillingly withheld, there is by the charter wisely reserved to the council, the power of providing against such contingencies, and continuing to the individual his full rights and privileges; and the council will never permit an institution which exists for mutual benefit to become oppressive to any one of the individuals who compose it.

The exigencies of the institution imperatively demanded such an increase in the annual subscriptions. The present premises are too well known to be perfectly inadequate to the wants of the institution, and all applications to the Government having been unavailing, the council have taken premises in Great George-street, which are from their extent extremely well-suited to the purposes of the institution, and sufficient for its accommodation for years to come, from their contiguity also to the Houses of Parliament, extremely conveniently situated for those non-residents who are brought annually to town on Parliamentary business. In these premises there will be a spacious and lofty meeting room, a model room, a gallery forty feet long, a library, and council-room, and many other rooms admirably adapted for reading-rooms, and private meeting rooms for the convenience of the general body.

Independently, however, of the necessity of providing more spacious premises, it has become of paramount importance that the general body should, by the publication of transactions, minutes of proceedings, and the issuing of weekly notices, be regularly made acquainted with what has occupied, or continues to occupy, the attention of the meetings; since it is by these means that the institution is to be carried on with energy and efficiency, as well as by furnishing every facility for consulting the documents, and every reasonable convenience and comfort for the accommodation of those who frequent the house of the institution. The council trust that their efforts to advance the institution will

be responded to by the general body, and that those funds which may be required for establishing and maintaining the institution in a manner worthy of the name and character of the profession will not be withheld.

In making, however, this urgent call for increased funds, the council cannot omit to advert briefly to a misconception which has arisen in the minds of some, as to whether the new enactments respecting the subscriptions are to be imperative on the existing body. That it is extremely desirable for the advance of the institution, that each one should consider them, so far as may lie in his power, as imperative, no one can doubt; but in this, as in all other cases, it was never the intention of the council to bring forward or to enforce any regulations which should not be cordially responded to by the general body. That the class of members did cordially assent to these enactments respecting the increased subscriptions may be most reasonably inferred, since the by-laws relating to them passed without any discussion, and without a single dissentient voice.

An alteration has also been made in the constitution of the council. This has hitherto been composed entirely of members; it has been thought advisable that the general body should have the power of adding two associates; that as the institution is considerably indebted to their active co-operation, the council also should not be deprived of the valuable assistance of some of the distinguished individuals enrolled in that class. They recommend, therefore, to the meeting, that two associates should be added to the council. On the other alterations tending to give greater efficiency to the institution, the council cannot now dwell.

The council will now proceed to advert to the other events of the past year; and they have great satisfaction in being able to report that considerable progress has been made towards arranging the many valuable documents in possession of the institution. A catalogue of the library has been printed, and the greater part of the books and pamphlets have been bound, and so arranged as to be readily referred to by means of an interleaved catalogue, in

which the place of each work is distinctly registered. Catalogues have also been made of original communications, and of the Telford plans, and cases provided for the latter so as to be conveniently consulted. The complete arrangement of the invaluable manuscript documents of the Telford bequest is a task of no ordinary difficulty, but one to the speedy completion of which the attention of the future council should be especially directed.

The attention of the council has been directed to the publication of an abstract of the papers read, and of the conversations which take place; and such an abstract, under the title of minutes of proceedings, was published soon after the close of last session. On the advantages of this plan it is almost unnecessary to insist, since it has been adopted and approved by many eminent societies. The public is thus brought immediately into contact with the institution; the labours and opinions of the author are made known and canvassed while the subject is yet warm with interest, and attention is continually kept alive to the state and progress of each department of knowledge. An authentic and public record also is thus opened, and the credit due to authors for priority of invention and discovery is secured as matter of history. Add to which, there are communications of transient interest, but which could not be deferred to the publication of the Transactions.

The attention of the council has also been directed to the publication of another volume of the Transactions; several communications have been selected, and the work is in so forward a state, that the institution may confidently expect the publication of the second volume before the close of the present session.

The council have also to congratulate the institution on the completion of the Telford prize medals. This beautiful specimen of Mr. Wyon's skill, with the head of Telford on the obverse, and the Menai-bridge on the reverse, was completed last year.

Several important subjects have been published for prizes during the ensuing session, and the council have every reason to expect many valuable communications on these subjects; and they

would also take this opportunity of reminding those who may be preparing communications on any of these subjects, that they are to be sent in on or before the 31st of next March.

On the proceedings of last session it is unnecessary to make any other remark than that they exceeded in interest those of any preceding session, both in the variety of the subjects embraced, and in the interest excited. The minutes of proceedings already alluded to will furnish a brief account of all the communications which were made, and the discussions to which they gave rise.

The presents, during the last year, have been exceedingly numerous and valuable, and the council would take this opportunity of acknowledging their obligations to the Lords of the Admiralty, to Captain Beaufort, and to Lieutenant Beecher, for the Admiralty charts; to the Lord Lieutenant of Ireland and Colonel Colly, for several of the ordnance maps of Ireland; and to your president, for the volumes of the Philosophical Transactions, which complete the set of 123 volumes from the commencement, presented by him to the institution. The other presents are far too numerous to be here mentioned.

The council have to regret the loss to the institution by death of its member, Arthur Woolf. This distinguished individual was born at Camborne, in Cornwall. He was a millwright, and in that capacity went to London, and was employed in Meux's brewery. In 1804, he took out a patent for his two-cylinder engine, working high-pressure steam in a small cylinder, and allowing it to expand in a large one. When he first commenced erecting engines in Cornwall, he induced the proprietors of the foundries to improve their machinery, that a better style of workmanship might be used in the manufacture of steam-engines; and he introduced an improved Hornblower's double-beat valve. The work done at the Consolidated Mines, proves him to have been a person of great talents. In October, 1814, the average duty of the engines in Cornwall was 20½ millions—Woolf's engine at Wheal Abraham, however, performed 34 millions—and in December, 1815, 52 millions; and in May, 1816, 57 millions; while the average duty of all the engines reported in Cornwall was 23 millions. In 1820, Mr. Woolf erected engines at the Consolidated

Mines having cylinders of 90 inches in diameter, and a stroke of 10 feet—the most powerful that had ever been constructed. In December, 1827, a trial took place with one of Woolf's 90-inch engines, and it performed a duty of 63½ millions—the average duty of 47 engines reported in this year was 32 millions. For some years before his death he received a pension of 100*l.* a-year from the proprietors of the Consolidated Mines. His name is associated with the improvements in the drainage of the Cornish mines; and whatever share posterity may assign to his individual genius in these improvements, his name is recorded in the page of history among those who have dedicated their talents and the opportunities of a long life to the advancement of practical science.

The council have also endeavoured to make arrangement for a supply of original communications for the present session. With this view they, in addition to the notice of prize subjects already mentioned, have issued a list of subjects for discussion which were brought before the institution during the last session, and requested such information upon them as parties might be able to communicate.

On several of these, important information has been received. The council have also received promises of many communications at an early period, so that they look forward with confidence to the present session being equal in importance to any which has preceded it.

Confident in this belief, they resign with the greatest satisfaction the trust which has been confided to them. Their efforts during the past year to render the institution more efficient and useful, have been amply rewarded in the success which has attended them; and they trust that, in every succeeding year, the institution will more and more fully realize the hopes of its most sanguine supporters, and ere long be recognised by all as conferring an honour no less on the British nation than on every one of those by whose superintendence it is continually adapted to the wants of each successive generation.

List of Patents

Granted by the French Government from the 1st of July to the 30th of September, 1837.

(Continued from page 122.)

To Nicolas Joseph Jonval, of Paris, for an hydraulic press.

— Jacques Masson, of Beaucaire, for a new system of artesian wells.

— Jean Eugene Robert, for an apparatus for procuring instantaneous light.

— Pierre Isidore Rouen, of Paris, for a new hydraulic lamp.

— Josin and Bezancourt, of Paris, for improved urinals.

— Marie Denis Franchant, of Paris, for an ornamental support for bed-curtains.

— Marie Haranger, of Paris, for an improved kind of stage coach.

— François Nicolas Faubert, of Paris, for an improved sharpener for setting knives.

— Pierre François Germain Daussin, of Paris, for ornamented liquorice lozenges.

— Jean Claude Briet, of Paris, for an improved fire-box.

— Guillaume Felix Aroux, of Elbeuf, for a new woollen fabric.

— Pierre Gaussen, of Lusson, for a motive power for driving machinery.

— Louis Julien Allix, of Paris, for an improved method of fixing colours on wax figures.

— Dominique Lenoir, of Paris, for certain improvements in public urinals.

— Victor Théodore Legendre, of Paris, for an improved fountain pen.

— Lagarde, senior, iron-master, of Charleville, for the carbonising of wood with the flame which escapes from puddling furnaces.

— Jean Dominique Parfait Hortier, for hygienic cloths, operating the cure of gout, rheumatism, &c.

— Berolla Brothers, of Paris, for a new circular escapement for watches and clocks.

To Auguste Souchière, of Paris, for an analeptic syrup.
— Jacques Augustin Dupy, of Montpellier, for a machine for crushing olives.
— Charles Louis Margras, of Paris, for improvements in opera glasses.
— Auguste Granger, of St. Genis Laval, for a new system of hooks and straps for clogs.
— Jean Georges David, of Paris, for an improved wheel.
— Collard Noiron, of Pierry, for a frame for making baskets for packing up champagne wines.
— Joseph Honoré Beisson, of Marseille, for a new discolouring substance.
— Henri Mourer, of Hellimer, for a new apparatus for locking wheels of carriages,
— Leon Berteaux, of Paris, for improvements in paper hangings.
— Bertrand and Houet, of Paris, for an improved steam-engine.
— Jean André Barthelemy, of Marseille, for a new process for reviving animal charcoal.
— Villeminot Huart and Bureau, of Rheims, for improvements in the combing of wool.
— Edouard Joseph Tonnel, of Paris, for improvements in organs.
— Cesar Roux, of Nimes, for improvements in the Jacquart frame.
— Henriette Jeanne Louvet, of Paris, for an improved sucking bottle for infants.
— Edme Augustin Chameroy, of Paris, for an expressive organ.
— Auguste Boulard, of Ville Neuve, for glass pens.
— Henri Léon, of Paris, for an improved slide for umbrellas.
— Etienne François Hudde, of Villiers le Bel, for certain improvements in locks.
— François Cavé, of Paris, for improvements in paddle-wheels.
— Rolland and Voillemont, of Blaise, for an improved plough.
— Renault and Dubus Bonnel, of Lille, for improvements in dyeing.
— Georges Oberhauser and Trecourt, of Paris, for a new microscope.
— Jean Antoine Maratuch, of Paris, for an apparatus for curing smoky chimneys.

List of Patents

Granted in Scotland between 22d April and 22d May, 1838.

To William Chubb, of Portsea, in the borough of Portsmouth, umbrella manufacturer, for certain improvements on night commode pans and chamber pots.—25th April.

— William Holme Heginbotham, of Stockport, for certain improvements in the construction of gas retorts.—26th April.

— Pierre Armand Lecomte de Fontainemoreau, of Charles-street, City-road, London, in consequence of a communication from a foreigner residing abroad, for an improved method of preventing the oxydation of metals.—7th May.

— Thomas Ridgway Bridson, of Great Bolton, for certain improvements in the construction and arrangement of machinery or apparatus for stretching, mangling, drying, and finishing woven goods or fabrics, and part or parts of which improvements are applicable to other useful purposes.—11th May.

— John Whyte, of Haddington, ironmonger, for certain improvements on stoves for producing heated air, applicable to ovens, or where heated air is required.—11th May.

— Hippolyte François, Marquis de Montauban, colonel of cavalry, residing in Sloane-street, Chelsea, and John Carvalho de Medeiros, of Old London-street, London, merchant, in consequence of a communication from a foreigner residing abroad, for certain improvements in the means of producing gas for illumination, and also in the construction of burners for consuming gas.—14th May.

New Patents

SEALED IN ENGLAND.

1838.

To John Paterson Reid, power-loom manufacturer, in Glasgow, and Thomas Johnson, of the same place, me-

chanic, for their invention of certain improvements in preparing yarn or thread by machinery, suitable for warps in preparation for weaving in looms.—Sealed 28th April—6 months for inrolment.

To Joseph Jepson Oddy Taylor, of Gracechurch-street, in the city of London, machinist, for his invention of an improved mode of propelling ships and other vessels on water.—Sealed 1st May—6 months for inrolment.

To Miles Berry, of Chancery-lane, in the county of Middlesex, patent agent, for a new and improved method or process of alloying metals by cementation, particularly applicable to the preservation of copper, wrought or cast iron, and other metals, and thereby operating a change in the appearance of their surface, and giving them more brilliancy, being a communication from a foreigner residing abroad.—Sealed 3d May—6 months for inrolment.

To John Ball, of Finsbury-circus, in the county of Middlesex, merchant, for improvements in carriages, being a communication from a foreigner residing abroad.—Sealed 3d May—6 months for inrolment.

To Edward Cobbold, of Long Metford, in the county of Somerset, clerk, master of arts, for his invention of certain improvements in the manufacturing gas for affording light and heat, and in the application of certain products thereof to useful purposes.—Sealed 5th May—6 months for inrolment.

To Edmund Shaw, of Fenchurch-street, in the city of London, stationer, for improvements in the manufacture of paper and paper boards, being a communication from a foreigner residing abroad.—Sealed 5th May—6 months for inrolment.

To Thomas Joyce, of Camberwell New-road, in the county of Surrey, gardener, for his invention of certain improved modes of applying prepared fuel to the purposes

of generating steam and evaporating fluids.—Sealed 5th May—6 months for inrolment.

To Pierre Armand Lecomte de Fontainemoreau, of Charles-street, City-road, in the county of Middlesex, for an improved method of preventing the oxydation of metals, being a communication from a foreigner residing abroad.—Sealed 5th May—6 months for inrolment.

To William Gossage, of Stoke Prior, in the county of Worcester, manufacturing chemist, for his invention of certain improvements in manufacturing sulphuric acid.—Sealed 8th May—6 months for inrolment.

To William Henry James, late of Birmingham, and now of London, civil-engineer, for his invention of certain improvements in machines or apparatus for weighing substances or fluids, and for certain additions thereto, applicable to other purposes.—Sealed 8th May—6 months for inrolment.

To William Crofts, of Radford, in the county of Nottingham, machine maker, for his invention of improvements in the manufacture of lace.—Sealed 10th May—6 months for inrolment.

To Miles Berry, of Chancery-lane, in the county of Middlesex, patent agent, for a new or improved method of applying certain textile and exotic plants, as substitutes in various cases for flax, hemp, cotton, and silk, being a communication from a foreigner residing abroad.—Sealed 14th May—6 months for inrolment.

To Jean François Isidore Caplin, of Portland-street, in the county of Middlesex, artist, for improvements in stays or corsets, and other parts of the dress where lacing is employed, and in instruments for measuring for corsets or stays, and for the bodies of dresses, being a communication from a foreigner residing abroad.—Sealed 14th May—6 months for inrolment.

To Alexandre Happey, of Basing-lane, in the city of London, gentleman, for a new and improved method of extracting tar and bitumen from all matters which contain those substances, or either of them, being a communication from a foreigner residing abroad.—Sealed 14th May—6 months for inrolment.

To Thomas Mellodew, of Wallshaw-cottage, near Oldham, in the township of Oldham, in the county of Lancaster, mechanic, for his invention of certain improvements in looms for weaving various kinds of cloth.—Sealed 15th May—6 months for inrolment.

To James Vincent Desgrand, of Size-lane, in the city of London, merchant, for a certain new pulpy product or material, to be used in manufacturing paper and pasteboard prepared from certain substances not hitherto used for such purposes, being a communication from a foreigner residing abroad.—Sealed 15th May—6 months for inrolment.

To Francis Thorpe, of Knaresborough, in the county of York, flax-spinner, for his invention of certain improvements in machinery or apparatus for heckling, preparing or dressing hemp, flax, and other such like fibrous materials.—Sealed 15th May—6 months for inrolment.

To David Stead, of Great Winchester-street, in the city of London, merchant, for an invention for making or paving public streets and highways, and public and private roads, courts and bridges, with timber or wooden blocks, being a communication from a foreigner residing abroad.—Sealed 19th May—4 months for inrolment.

To Samuel Seaward, of the Canal iron-works, in the parish of All Saints, Poplar, in the county of Middlesex, for his invention of certain improvements in steam-engines. —Sealed 21st May—6 months for inrolment.

To Augustus Applegath, of Crayford, in the county of Kent, calico-printer, for his invention of improvements in

apparatus for block-printing.—Sealed 22d May—6 months for inrolment.

To Henry Adcock, of Liverpool, in the county of Lancaster, for his invention of improvements in raising water from mines and other deep places, or from a lower level to a higher, which improvements are applicable to raising liquids generally, and to other purposes.—Sealed 22d May—6 months for inrolment.

To John Ratcliff, of Birmingham, in the county of Warwick, lamp manufacturer, for his invention of improvements in lamps.—Sealed 22d May—6 months for inrolment.

To Robert Martineau, of Birmingham, and Brook Smith, of the same place, both in the county of Warwick, cock-founders, for their invention of improvements in cocks for drawing off liquids.—Sealed 24th May—6 months for inrolment.

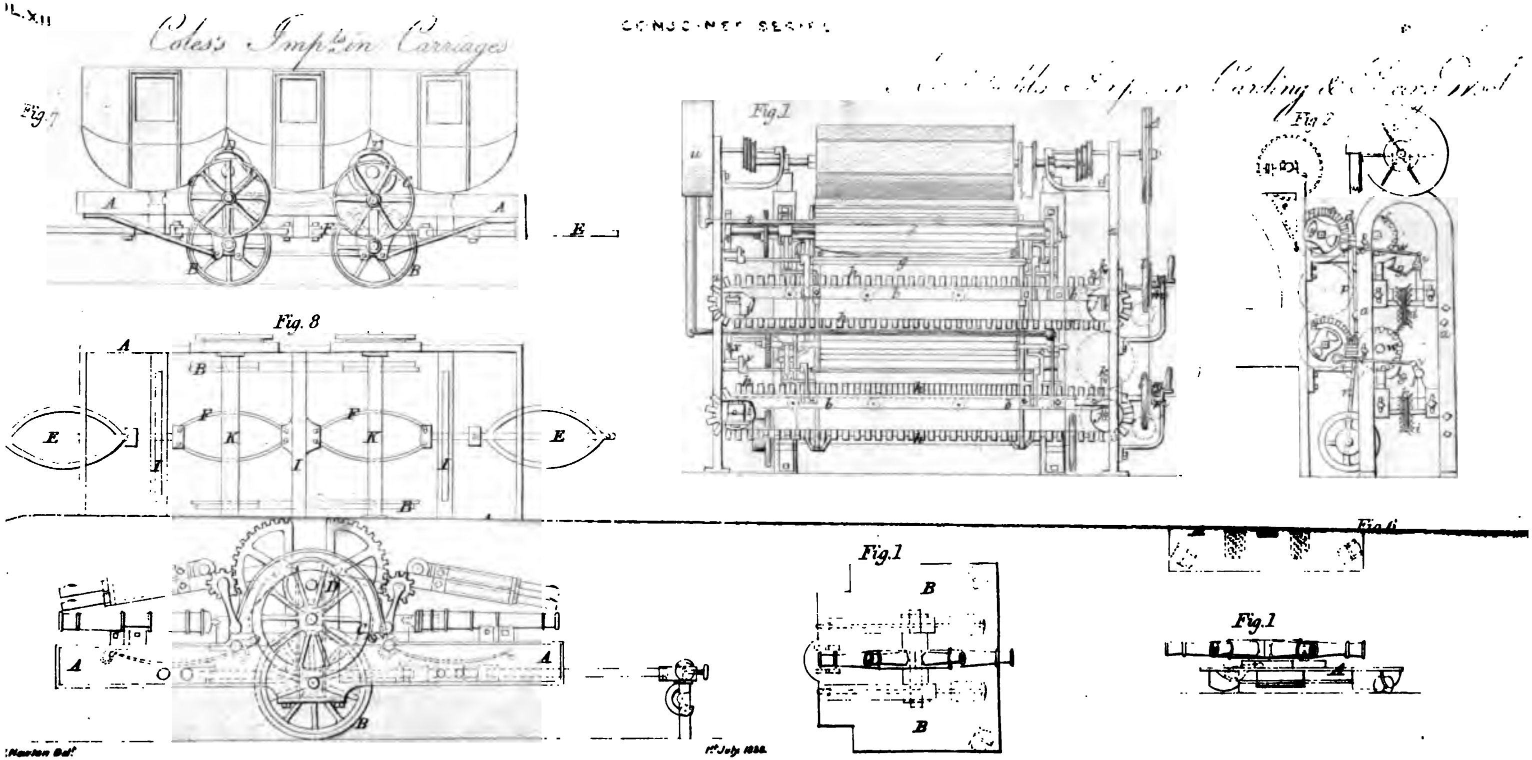
To John Ratcliffe, of Stockport, in the county of Chester, machine agent, for his invention of a new method of removing the fly droppings, waste, and other matters, which being separated from the material, falls below the cylinders and beaters in the respective processes of carding, willowing, devilling, batting, blowing, scutching, opening, or mixing, of cotton, silk, flax, wool, or any other fibrous material or substance.—Sealed 24th May—6 months for inrolment.

To Charles Searle, of Fitzroy-street, London, in the county of Middlesex, for his invention of a new description of aerated water or waters, and which method of aerating is applicable also to other fluids.—Sealed 24th May—6 months for inrolment.

CELESTIAL PHENOMENA, for June, 1838.

D.	H.	M.	
1			Clock after the sun, 2m. 36s.
—			☽ rises 0h. 44m. A.
—			☽ passes mer. 7h. 11m. A.
—			☽ sets 1h. 14m. M.
	9	35	♃'s first satt. will em.
2	23	57	♅ in quad. with the ☉
3	8	52	♀ in Aphelion.
5			Clock after the sun, 1m. 58s.
—			☽ rises 5h. 36m. A.
—			☽ passes mer. 9h. 59m. A.
—			☽ sets 1h. 55m. M.
6	1	53	♄ in conj. with the ☽ diff. of dec. 6. 0. N.
7	9	56	♃'s third satt. will em.
8	4	51	Ecliptic oppo. or ○ full moon.
	11	29	♃'s first satt. will em.
10			Clock after the sun, 1m. 3s.
—			☽ rises 11h. 11m. A.
—			☽ passes mer. 1h. 45m. M.
—			☽ sets 5h. 3m. M.
12	8	19	☿ greatest elong. 23. 5. W.
13	6	44	☿ greatest hel. lat. S.
	18	40	♅ in conj. with the ☽ diff. of dec. 1. 46. N.
14	1		☽ in Perigee.
	10	45	♃'s third satt. will im.
15			Clock before the sun, 0m. 2s.
—			☽ rises 0h. 28m. M.
—			☽ passes mer. 6h. 14m. M.
—			☽ sets 0h. 16m. A.
	2	31	☽ in □ or last quarter.
	14	54	Vesta in conj. with ☿ diff. of dec. 1. 2. S.
17	4		♅ stationary.
	16	3	Juno in oppo. to the ☉
18			Mer. R. A. 4h. 12m. dec. 18. 24. N.
—			Venus R. A. 2h. 49m. dec. 13. 40. N.
—			Mars R. A. 3h. 58m. dec. 20. 27. N.
—			Vesta R. A. 4h. 5m. dec. 16. 41. N.
—			Juno R. A. 17h. 46m. dec. 4. 30. S.
—			Pallas R. A. 6h. 27m. dec. 0. 40. N.
18			Ceres R. A. 7h. 41m. dec. 26. 48. N.
—			Jupiter R. A. 10h. 53m. dec. 8. 23. N.
—			Saturn R. A. 15h. 26m. dec. 16. 26. S.
—			Georg. R. A. 22h. 56m. dec. 7. 36. S.
—			Mercury passes mer. [illegible]h. 28m.
—			Venus passes mer. 21h. 4m.
—			Mars passes mer. 22h. 12m.
—			Jupiter passes mer. 5h. 7m.
—			Saturn passes mer. 9h. 39m.
	8	25	♀ in conj. with the ☽ diff. of dec. 5. 41. S.
19	9	26	♃'s second satt. will em.
	15	15	♂ in conj. with the ☽ diff. of dec. 4. 11. S.
	23	33	☿ in conj. with the ☽ diff. of dec. 6. 46. S.
20			Clock before the sun, 1m. 3s.
—			☽ rises 1h. 51m. M.
—			☽ passes mer. 10h. 28m. M.
—			☽ sets 7h. 22m. A.
21	10	19	☉ enters Cancer, Summer commences.
22	2	34	Ecliptic conj. or ● new moon.
23	11	5	Vesta in conj. with ♂ diff. of dec. 4. 4. S.
24	9	47	♃'s first satt. will em.
	11	18	♂ in the ascending node.
25			Clock before the sun, 2m. 8s.
—			☽ rises 6h. 49m. M.
—			☽ passes mer. 3h. 2m. A.
—			☽ sets 10h. 55m. A.
26	6	23	♀ greatest hel. lat. S.
27	9	27	♃ in conj. with the ☽ diff. of dec. 1. 9. S.
28	6		☽ in Apogee.
30			Clock before the sun, 3m. 10s.
—			☽ rises 0h. 49m. A.
—			☽ passes mer. 6h. 25. A.
—			☽ sets 11h. 50m. A.
	1	12	☽ in □ or first quarter.
	15	42	☉ in Apogee.

J. LEWTHWAITE, Rotherhithe.


Coles's Impts in Carriages
Fig. 7
Fig. 8
Fig. 1
Fig. 2
Fig. 1
Fig. 1
Fig. 6
Newton Delt
1st July 1836.

THE

London

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Recent Patents.

To John Archibald, *of the parish of Alva, in the county Stirling, in the kingdom of Scotland, manufacturer, for his invention of certain improvements in machinery or apparatus for carding wool, and doffing, straightening, piecing, roving, and drawing rolls or cardings of wool.* —[Sealed 4th August, 1836.]

My improvements in machinery for carding wool, and doffing, straightening, piecing, roving, and drawing rolls or cardings of wool, consist in a certain construction and arrangement of mechanism adapted to a carding engine; by means of which I am enabled to doff or deliver a greater quantity of wool, or a greater number of cardings or rolls of wool, suited for clothing purposes, than can be obtained by the ordinary mode of conducting that operation; which advantage is effected by the use of two doffing cylinders, partially covered with sheets of wire cards, in a peculiar

way, and a novel mode of working the doffer combs. I am also, by my improved mechanism, enabled to straighten out such rolls or cardings of wool, as they successively fall from the roll boxes, and to piece or join them together end to end, so as to form two continuous rolls or continuous lengths of carding from one engine: and I likewise, by my improved mechanism, cause the said continuous rolls or cardings to be drawn or extended in order to perform partially the effect of slubbing or roving.

These improvements will be further explained by reference to the Plate IX., in which the similar letters of reference point out the same parts of the machinery in all the figures.

The improved mechanism is principally contained within a framework of iron, placed at the doffing end of the carding engine to which it is connected, and from which its moving parts are all actuated. Fig. 1, may be called a front elevation of the frame, with the carding engine seen behind; fig. 2, is an end elevation of the same, and a portion of the side of the carding engine; *a, a, a,* are the side standards of the framework, braced together firmly by horizontal bars *b, b, b, b.* Two doffing cylinders *c, c,* are mounted on axles in the carding engine, and receive the filaments of wool from the great cylinder in the usual way; *d, d,* are the doffer combs, which respectively strike off the filaments of wool from the cards of the doffing cylinders into the roll boxes *e, e.*

The fluted cylinders *f, f,* act in the usual way in rolling up the cardings or doffed filaments of wool in the boxes *e, e,* and discharging them in front; but in this instance, instead of the rolls or cardings of wool falling on to an endless cloth, as in ordinary carding engines, the rolls of wool, as they are severally thrown out of the roll boxes, fall into a sort of angular trough, formed by wings *g, g.*

At stated periods, these wings *g, g*, are thrown open, and the carding or roll of wool contained within is let fall on to a travelling endless strap *h*, distended over pulleys *i, j*, mounted in bearings affixed to the framework, which travelling strap conducts the roll or carding of wool in a lateral direction between the pulley *j*, and a pressing roller *k*; and when the doffed carding or roll of wool has been carried so far as to bring its end within a short distance of the end of the wings *g*, then the wings again open, and another length or roll of wool is let fall in a similar way on to the travelling strap *h*, which causes small portions of the filaments at the ends of the two rollers to be brought into contact. As the successive cardings or doffed rolls of wool are thus conducted onward by the endless carrying strap *h*, the two ends of the rolls in contact are pressed together in passing between the pulley *j*, and the pressing roller *k*; and their adhesion is further secured by the operation of twisting the fibres, which is effected as the carding proceeds between other rollers after it has quitted the carrying strap.

The carding or roll of wool is conducted from the pressing rollers *j, k*, between a pair of small drawing rollers *m, m*, which are made to revolve with a speed greater than that of the pressing rollers, in order to draw out or extend the fibres of the roll of wool. Between these drawing rollers and the pressing rollers, another pair of rollers *l, l*, of larger diameter, are mounted, turning at right angles to the former. The peripheries of these rollers are slightly convex, and are brought very nearly into contact; they both revolve in the same direction, and hence, as the roll of wool passes between them, it receives a temporary twist by the friction of the two revolving peripheries, which brings the fibres of the wool at the junctions of the end of the cardings into such a state of combination as to produce

adhesion, so that a perpetual roll of carding is obtained of any length that may be desired.

In order to render my improved mechanism still more evident, and the operation of producing perpetual rolls of wool more perfectly understood, I will first describe the peculiarity of my doffing apparatus: fig. 3, represents the two doffer combs *d*, *d*, attached to jointed rods *n*, *n*, the fluted cylinders and other mechanism in front being in this figure removed, in order to show the doffing apparatus more distinctly. Two vertical bars *p*, *p*, having guide slots, are made fast to horns or brackets, extending from the framing of the carding engine; and studs *q*, *q*, *q*, *q*, affixed to the jointed rods *n*, *n*, slide in the slots of these bars *p*, *p*, for the purpose of guiding the doffer combs as they are raised and depressed by the rotation of the crank shaft *r*, at bottom; fig. 4, represents one of the jointed rods of the doffer comb as it would appear when seen sideways; and fig. 5, is a similar view of one of the guide bars; *s*, is the joint or hinge on which the jointed rods bend, as the doffer combs move up and down; and by means of these joints *s*, and the studs *q*, *q*, which slide in the guide bars *p*, *p*, the doffer combs are thrown off from the doffing cylinders in rising, and are brought on, that is, into operation, in falling; the movements of which, it will be perceived, are produced by the revolving crank shaft at bottom, driven in the usual way.

The two doffing cylinders I make of any diameter that may be required, and upon their peripheries I place two, three, or more sheets of wire cards, extending from end to end in the direction of the axis, observing that the blank spaces upon the peripheries of the doffing cylinders, between the sheets of card, must not be less in breadth than the breadths of the sheets; and the relative positions of the doffing cylinders in the engine, must be such as to cause

the several sheets of cards of the two cylinders to come alternately into operation, in order that the cards of each doffing cylinder may respectively take the wool from the great carding cylinder at intervening spaces of time.

The filaments of wool thus successively struck off or doffed from the doffing cylinders, fall between the revolving fluted cylinders *f*, *f*, and their boxes *e*, *e*, as usual, for the purpose of being rolled up into the forms of ordinary cardings or rolls of wool; and they are thrown out at the front of each box into the angular trough *g*, *g*, placed there to receive them. As, however, it is of importance that each roll of wool should be laid in its trough as straight as possible, I have found it desirable to form the front edge of each roll box of thin metal, in order to prevent the filaments of wool hanging to the wooden box; and I also curve the front edge or lip of the box slightly downwards in the middle, as shown in fig. 1, for the purpose of causing the middle part of the roll of wool to be first passed out of the roll box, as by that mode of falling it will be more readily enabled to place itself straight along its trough. And to facilitate this, as well as to prevent the fibres of the wool adhering to the periphery of the fluted cylinder *f*, I direct a blast of wind downward over the front of the fluted cylinder, from a row of small holes in a horizontal pipe *t*. This blast of wind may be forced into the pipe by a rotary fan in the wind box *u*, worked by a pulley and band from the shaft of what is called the fancy cylinder, or by any other convenient means.

In the front view of the mechanism, fig. 1, and also in the side view, fig. 2, it will be perceived that the wings of the upper angular trough, *g*, *g*, are closed, in order to receive the carding or roll of wool when it falls from the roll box, *e*; but the right hand end of the trough has a small opening at *z*, for the purpose of allowing a portion of the

carding, or roll toward its end to hang down and touch the previously deposited carding or roll of wool which is moving along in a lateral direction with the travelling strap *h*, below. By this means, I ensure the contact of the fibres of the two rolls or cardings; and when the lower roll or carding has been conducted by the travelling strap so far toward the right hand, as to bring its end within about an inch and a half of the end of the carding or roll hanging from the trough above, then the wing of the trough is thrown open, and the roll falls on to the endless travelling strap *h*, and is moved onward by it, the ends of the two rolls being in contact. But for the purpose of laying the carding or roll of wool perfectly straight upon the strap *h*, I have placed a small lip at the left hand end of the back wing of the trough, shown by dots in fig. 1, which holds up that end of the roll of wool, until it is drawn off by the progress of the travelling strap, which consequently draws it straight. I may here remark, that I have found it desirable to attach a series of forks, made of slight strips of tin, as guides, extending on each side of the carrying strap, which effectually prevents the carding or roll of wool falling over the side, or otherwise getting out of its proper position.

The means by which the opening of the trough *g*, is effected, will be perceived by reference to the end view, fig. 2. A crank arm *v*, is affixed to the shaft of the front or moveable wing *g*, which is connected to a horizontal rod *w*, hanging by a joint upon a crank arm *x*, attached to the side standard frame. The reverse end of this rod *w*, carries an antifriction roller, which bears against the periphery of a rotary cam *y*, fixed upon the shaft of the doffing cylinder; and hence, as the doffing cylinder revolves, the larger radius of the cam forces back the rod *w*, and crank arm *v*, and keeps the moveable wing of the trough *g*, closed; but when, as the cam *y*, revolves, the antifriction roller of the

rod *w*, is allowed to fall from the greater to the lesser radius of the cam, the rod instantly recedes, and the wing of the trough falls open, allowing the carding or roll of wool to descend on to the endless travelling strap *h*, as above described.

The cardings or rolls of wool carried along laterally by the travelling band *h*, as before stated, passes under the pressing roller *k*, and the ends of the two rolls of wool brought together, as described, are thereby pressed into more immediate contact. The ends of the axle of each pressing roller *k*, work loosely in grooved brackets; affixed to the bar *b*, they press by their own gravity, and revolve by the friction of the travelling straps *h*, *h*, passing under them. These travelling straps *h*, *h*, and the pulleys *i*, *j*, *i*, are actuated by means of bevel and spur gear from the carding engine. From the pressing rollers, the united cardings or rolls of wool are led off to the pair of drawing rollers *m*, *m*, which have plain peripheries. The lower drawing roller is mounted in bearings affixed to a bracket extending from the end of the framework, and is driven by gear through an intermediate wheel, taking into a spur wheel on the shaft of the pulley *j*; the upper drawing roller, which turns by friction, is mounted in an arm having a joint, which allows of its being raised, as shown in the partial end view, fig. 6. The twisting rollers *l*, *l*, are a pair of plain wheels rounded at their edges, they turn on studs fixed to the end frame, and revolve with their peripheries nearly in contact. On the side of each wheel *l*, a grooved pulley is formed, and under each pulley a band passes from a large pulley A, above, which is driven by a cone pulley fixed on its shaft, carrying a band from the shaft of the fancy cylinder. Thus, the wheels *l*, *l*, are both made to revolve in the same direction; and by pincing the carding or roll of wool in its passage between them as they revolve, cause the fibres of the wool to be temporarily

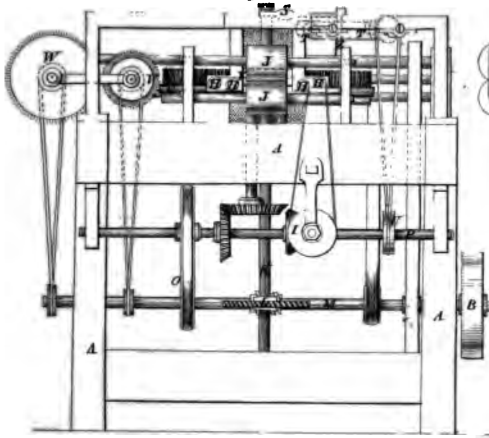
twisted, which brings the fibres at the end of the two conjoined rolls or cardings, sufficiently into combination to produce a perfect union or piecing of the ends of the cardings or rolls of wool.

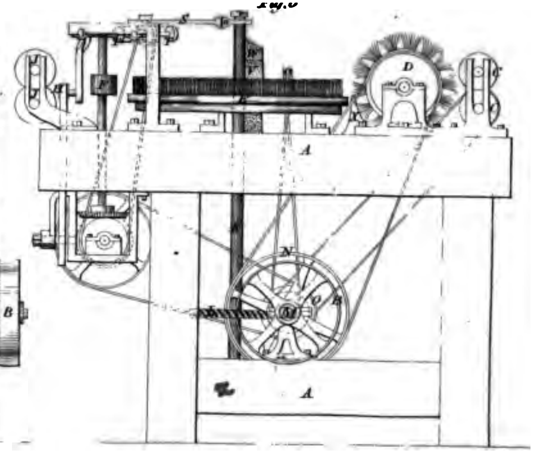
Having now described the construction and objects of my improvements in machinery for carding wool, and doffing, straightening, piecing, roving, and drawing rolls or cardings of wool, I lastly declare, that the particular features of my improvements consist in, first, the peculiar mode of working two doffer combs by jointed crank rods in connexion with two doffing cylinders; second, the angular troughs for receiving the rolls or cardings of wool when discharged from the roll boxes, and the curved form of the metal edges of those boxes; third, the endless travelling straps for receiving and conducting the successive rolls; fourth, the pressing rollers for connecting the rolls with the drawing rollers and twisting wheels; and fifth, the arrangement of the whole mechanism, for the purposes above stated.—[*Inrolled in the Rolls Chapel Office, February, 1837.*]

Specification drawn by Messrs. Newton and Berry.

To JOHN BARING, *of Bishopsgate-street, in the city of London, merchant, for an invention of certain improvements in machinery, or apparatus for combing or crushing and separating wool, being a communication from a foreigner residing abroad.*—[Sealed 3rd February, 1836.]

THESE improvements in machinery, or apparatus for combing or crushing and separating wool, consist in certain novel constructions and arrangements of machinery for partially combing or straightening the fibres of wool, and





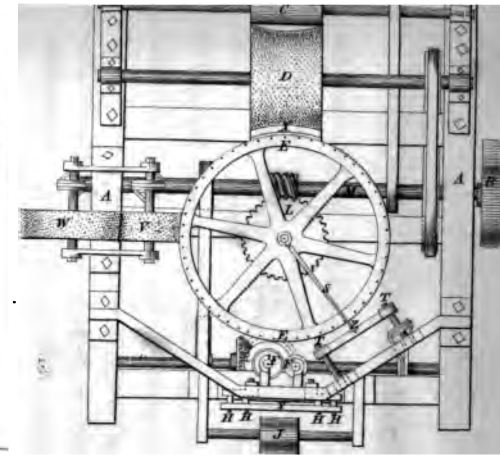


Fig.1

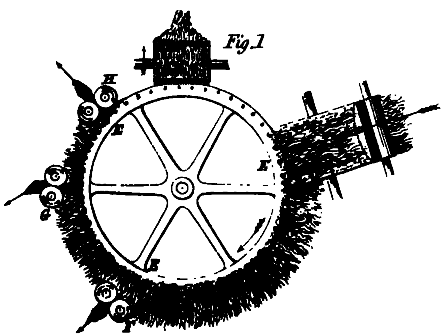


Fig. 2

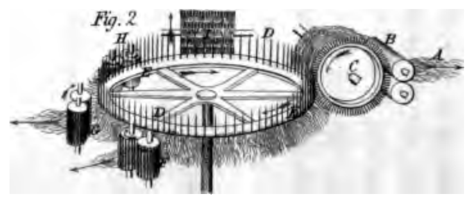
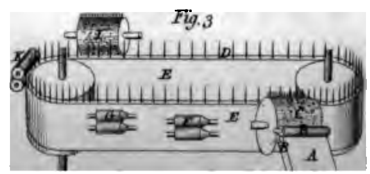
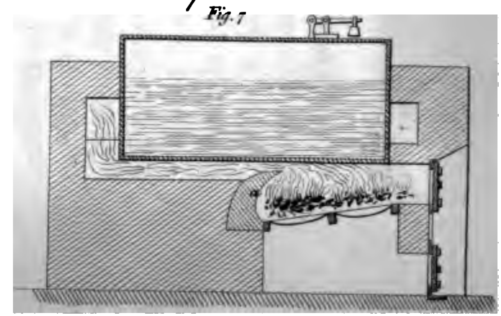


Fig.3



Hopkins's Furnace

Fig. 7



depositing the same upon travelling combs, in order that the wool of different lengths may be severally taken therefrom in separate and distinct fillets of fibre, by taking-off or conducting rollers; and the wool having been so separated and sorted into its respective lengths, the short wool left in the combs is afterwards taken off by a comb or brush, or cleaning roller.

The wool being spread by hand upon an endless feeding cloth in the first instance, is delivered into the machine through a pair of ordinary feeding rollers in a thin layer, from whence it is taken by a revolving cylinder or drum, covered with card teeth, or wires, or bristles, or a mixture of them, and deposited on to the points of a set of travelling combs, placed nearly in contact with the periphery of this combing and brushing cylinder. The filaments of wool are drawn out from between the feeding rollers by the carding and brushing cylinder, and carried to the travelling combs, which move slowly along in front of the cylinder, and the wool is taken therefrom by the travelling combs, between the teeth of which it hangs as a fringe; and as the carding cylinder revolves much faster than the combs travel, the pendant wool becomes combed and brushed down by the action of the cylinder, at the same time that it is depositing fresh wool on to the combs.

The combs carry the fringe of wool past two or more pairs of the taking-off or conducting rollers, situate at different distances from the face of the travelling combs, by which means the ends of the longest fibres of wool are first presented to the pair of taking-off rollers which are placed at the greatest distance from the travelling combs, in order that the first pair of rollers may take hold of, draw out, and conduct away the longest wool: the second pair of conducting rollers, situate nearer to the combs, taking the next length of fibre, and so on until the different lengths

of wool are separately drawn from the travelling combs by the different pairs of taking-off or conducting rollers. The remaining short wool or noile is removed from the combs by the action of another cylinder furnished with cards, or comb teeth, or brushes, and which cylinder is cleared of the wool by a picker cylinder, or doffer, in any convenient manner.

In describing the construction and operation of these machines, I shall first refer to the diagrams in Plate X., figs. 1, 2, and 3, and then proceed to the more detailed drawing of the machinery at figs. 4, 5, and 6.

Figs. 1, and 2, are diagrams to explain one construction of these improved machines, the travelling combs being formed by a horizontal revolving circular rim, round the edge of which are set a row or rows of vertical points or comb teeth.

Fig. 3, is a diagram of another construction, in which the combs are placed vertically along the upper edge of a travelling belt passed round two drums or rollers; the same letters referring to corresponding parts in all these figures: A, is the layer of wool spread on the feeding cloth by hand; B, a pair of feeding rolls revolving slowly; C, the carding or brushing and combing cylinder revolving rapidly, and drawing the wool from between the feeding rollers: by the rapid rotation of this cylinder, the fibres of the wool are thrown on to the teeth D, of the revolving or travelling combing rim E, which passes slowly in front of the roller. The wool thus received on to the points of the combs hangs out or projects round the comb, and its fibres are partially straightened by the wires or brushes of the rapidly revolving cylinder C; F, is the first pair of taking-off and conducting rollers, placed at a suitable distance from the combs to take hold of the longest fibres of the wool, and separate them from the short; G, is a second pair of taking-

off and conducting rollers, placed nearer the combs for separating the next length, and H, is a third pair of similar rollers placed still nearer the combs for taking off the shorter lengths of fibres; I, is the clearing cylinder furnished with suitable comb teeth, or needle points, or brushes, which take off or clears out of the points of the revolving heckles all the remaining short wool or noiles which from this cylinder is combed off or doffed in the form of a sliver.

Having explained the general arrangement of the parts of these improved machines, I shall now refer to figs. 4, 5, and 6, and more particularly describe the construction and operation of the same. Fig. 4, is a front elevation of a machine with a revolving circular comb; fig. 5, is a plan or horizontal view; and fig. 6, is a side elevation of the same: A, is the framework; B, the driving pulley, on the main shaft, by which the machine is put in motion; C, C, are the two feeding rollers through which the wool enters the machine from the feeding cloth; D, is the combing and brushing roller furnished with wire card teeth, or hair brushes, and is formed hollow, as shown in the drawings, to suit the shape of the rim E, which is mounted on the upright shaft K, with the comb teeth set vertically round its outer edge, and of a proper length, thickness, and distance apart, according to the nature of the wool to be operated upon: F, F, are one pair of drawing or taking-off rollers, to separate the longer from the shorter fibres; one is made of metal fluted on its periphery, and the other covered with leather: H, H, are small pulleys, over which a twisting or rubbing belt is passed, and is driven by the pulley I; J, J, are two delivering rollers. The vertical shaft K, on which the comb rim E, is mounted, is made to revolve slowly by means of the worm wheel L, which is driven by a worm or endless screw on the cross shaft M.

The brushing or combing cylinder D, is driven by a belt passed from the pulley N; the cross shaft P, is driven from the small pulley O; R, is a pair of bevel wheels for driving the taking-off or drawing rollers F; S, is an arm connected at one end to the upright shaft K, by means of an universal joint or coupling, the other end is connected to a leather belt passing over the pulleys T, T. At this end of the arm is a prong or wiper projecting downward as far as the bottom of the comb teeth; one of the pulleys T, is driven by the pulley U, on the front cross shaft P. The arm S, with the prong or wiper on its end is put in motion by the belt for the purpose of presenting the ends of the fibres to the rollers, so that they may take hold of them and draw the longer fibre out of the combs; V, is a conical drum or roller covered with card teeth or needle points, and is driven from the shaft M; X, is a curved apron, made of copper or other metal, placed under the brush or comb cylinder D, nearly in contact with its surface, and against which the fringe of wool is brushed or combed.

The operation of the machine is as follows:—The wool being first well straightened by hand on the endless feed cloth is passed through the feed rollers C, and is taken from them by the combing or brushing cylinder D, the periphery of which is placed nearly in contact with the points of the travelling comb teeth; by which means, as the combs pass slowly along, the cylinder D, in its swift revolution deposits the wool which it has taken from the feed rollers on to the comb teeth; and, further, the cylinder, in its rotation, takes or combs out the short wool not at first caught in the teeth, and again brings it over to the points of the combs, and continues this operation until the long wool is brushed, combed, and straightened, and the short wool is deposited in the comb teeth. This process or operation produces a fringe of long wool, combed or

brushed, and partially straightened, and is caught or held; together with the short wool in the comb teeth, extending from the teeth in proportion to its length; whereby the operator is enabled, by placing the drawing-off rollers E, nearer to, or further off, from the combs, to draw out the particular length of wool required, and leave the shorter fibres, or curled wool, in the combs, which is removed in the following manner:—As the travelling combs are charged with wool, their continuous motion causes the long wool to approach the pair of drawing rollers F, F 1 before reaching these rollers, the wiper performs its duty, which is to carry or sweep the ends of the fibres of long wool toward the drawing-off rollers, which immediately take hold of the ends of the longer fibre, and draw from the combs the long wool, which then passes between the twisting or rubbing belt, where it receives a slight rubbing or twisting, so as to collect the fibres, and give it a slight consistency as a roving; after which it is taken by the carrying rollers J, J, and delivered into cans or boxes in a continuous sliver or roving. After the taking-off rollers have drawn the long wool from the combs, the short wool, as the cylinder E, revolves, arrives opposite the drum V, by which it is taken out of the combs; from this drum it is taken by the picker cylinder W, and thrown into boxes, or it may be doffed in the ordinary manner. The empty combs, on again coming before the brushing or combing cylinder D, are again charged with wool, which is acted upon as already described, and the machine kept in constant operation; and heat may be applied to the machines in various ways, either by steam or otherwise, as most convenient.

I would here remark, that I am aware machines for combing wool have heretofore been constructed with re-

volving or travelling combing teeth, whereon wool has been combed; but in such machines the wool has been placed in a comber or slasher, the action of the travelling combs being only to remove the short or narled wool therefrom, the combed wool being held or retained in the slasher. And, further, in these kind of machines, the slasher or comber was supplied or charged at different times with portions of wool which were removed after being operated upon, the machine being stopped while a fresh supply of wool was given thereto: therefore, the claim of invention under this patent is not the constructing of machines with travelling combs, nor to any part or parts of the machine separately, nor is it intended to confine the construction of these machines to any particular form; but that which is intended to be claimed as the invention secured by the above in part recited Letters Patent, is the adaptation of the roller or cylinder, armed with teeth or brushes, for drawing the wool from the feeding roller, and depositing it on to the teeth of travelling combs; and at the same time, by its rapid rotation, partially combing or brushing the wool as the comb teeth move along at a comparatively slow speed before it; and, also, the adaptation of the several pairs of drawing rollers, placed at different distances from the combs, for the purpose of drawing it out from the comb, and thereby separating the long from the short fibres of the wool.—[*Inrolled in the Rolls Chapel Office, August*, 1836.]

To Miles Berry, *of the Office for Patents, Chancery-lane, in the county of Middlesex, civil-engineer, mechanical draftsman, and patent agent, for certain improvements in the preparation of palm oil, whereby it is rendered applicable to the woollen manufactures, lubricating of machinery, and other useful purposes, being a communication of a foreigner residing abroad.*—[Sealed 26th October, 1837.]

The Patentee describes this invention as consisting in bleaching and purifying palm oil, and rendering the same applicable to, and fit to be used in, the process of carding wool, in the currying of leather, lubricating of steam-engines and other machinery, the axles of locomotive carriages, oil-stones for sharpening edge tools, polishing and preserving metals from rust, for burning in lamps, as the basis of pomatums and oils, and such like compounds used for encouraging the growth of the human hair, for ointments and salves, for cattle medicines, and for various culinary, medicinal, and other useful purposes.

I take palm oil as imported, and known as an article of commerce; I then melt it in open vessels by the application of heat; I prefer the use of steam, and keep it in a liquid state for the space of twenty-four hours, or until the whole of the sand, dirt, or other foreign or extraneous matters contained in the oil have settled, and are deposited on the bottom of the vessel, or remain in the lower part of the material under operation. The upper part of the palm oil is then removed and poured into shallow vessels in which water is contained. These vessels are placed in the open air, and the oil is kept liquid by means of heat, steam being preferred; the steam heating pipes being in the water bath at the bottoms of the vessels; but the same effect

may be produced by a steam bath or casing surrounding the vessels, as in ordinary sugar boiling pans, if preferred.

To the oil, at this part of the process, is to be added a sufficient quantity (say about 5 per cent.) of a metallic oxide, or alkaline, or earthy base, for the purpose of neutralising any acid that may naturally exist in the oil, and to facilitate the bleaching process. The bleaching can be effected without the application of the metallic oxide or alkaline, or earthy base, by the natural action of the sun and atmosphere alone, as is well known in the common process of bleaching bees-wax; but in this case longer time is required. The oil is placed in these bleaching vessels from one to two inches in depth upon the water bath, and it is kept at a heat of about 100 to 150 degrees, according to the temperature of the atmosphere, and is well agitated or stirred by manual labour or mechanical means, about every half hour, for a period of from two to four days, or until the oil has become of a very pale colour. The oil is now to be drawn off at its upper part and cooled, when it is fit for use; and is particularly adapted for soap-makers, curriers, perfumers and druggists, for pomatum and ointments; also for the oiling or lubricating of the axles of locomotive engines, railway carriages, pistons of steam-engines, windmills, and other heavy machinery.

In order to obtain a very clear and thin limpid or liquid palm oil, which will be applicable for carding wool, lubricating steam-engines and other machinery, as axles of carriages; for burning in lamps, and other purposes to which the part called the oleine or ealine of palm oil may be found most applicable and useful, I take the bleached and purified palm oil, prepared as above, and carefully separate the stearine by mechanical pressure, filtration, or any of the other known methods generally adapted for such purpose,

the palm oil being kept at a proper degree of temperature, according to the state of the atmosphere, to allow of such filtration or pressing operation.

The clear oil which flows from this last process is removed into tanks or vessels, which are heated by steam-pipes passing through the lower part of the oleine, which is to be kept in this state for several days, at a temperature of about 75 degrees, when any remaining stearine, as also any impurities or foreign matters, will settle to the lower part, or be deposited, and the pure oil or oleine, as it may now be called, is thereby rendered beautifully clear and fit for use; or the same effect may be obtained in another way for many of the above purposes; for instance, take palm oil, before it has been bleached and refined, and in that state effect a separation of the oleine from the stearine by either of the means (pressure or filtration) before mentioned, and bleach and purify the oleine and stearine separately, by the processes above enumerated.

Now, whereas, I claim, as the said invention, the operating upon palm oil, by submitting to the various processes hereinbefore described, and in manner hereinbefore described, and the application of the same for the various purposes before enumerated; and such invention being, to the best of my knowledge and belief, entirely new, and never before used within that part of her said Majesty's United Kingdom of Great Britain and Ireland called England, her dominion of Wales and town of Berwick-upon-Tweed, and also in all her Majesty's colonies and plantations abroad, I do hereby declare this to be my specification of the same; and that I do verily believe this, my said specification, doth comply in all respects, fully and without reserve or disguise, with the proviso in the said hereinbefore in part recited Letters Patent contained, wherefore I do

hereby claim to maintain exclusive right and privilege to the said invention.—[*Inrolled in the Rolls Chapel Office, April,* 1838.]

Specification drawn by Messrs. Newton and Berry.

To ROBERT WILLIAM SIEVIER, *of Henrietta-street, Cavendish-square, in the county of Middlesex, gentleman, for his invention of an improved waterproof cloth or fabric, made either elastic or non-elastic, applicable to various useful purposes, and for an improved manufacture of waterproof hats or caps.*—[Sealed 7th December, 1835.]

THE first branch or object of my invention is to produce non-elastic cloths or fabrics, hats or caps, with a nap or pile fixed on the surface thereof, by means of certain preparations of India rubber; and which process, at the same time, render such cloths or fabrics, hats or caps, waterproof: and I effect this first branch or object of my said invention in the several ways or modes following:—

I effect my object in producing a waterproof cloth or fabric, with a nap or pile fixed on the surface, in the following manner: I take web or fabric, woven in the usual manner, of cotton, wool, silk, or other similar material, and I spread over its surface, with a brush, or by any other convenient mode, India rubber dissolved in spirits of turpentine, or other proper solvent, and I repeat the application, if necessary, so as to fix a sufficient quantity of the preparation on the surface of the cloth or fabric, and so render it fit for the next application, which I am about to describe: I then take India rubber dissolved in spirits of

turpentine, or other proper solvent, and I mix therewith a portion of acetate of lead, litharge, sulphate of zinc, gum mastic, or any other proper drying material, in the manner hereinafter described, and I spread this preparation over the surface of the cloth or fabric, prepared for the purpose as hereinbefore mentioned, in order to render it more perfectly waterproof; and also for the purpose of receiving and more securely fixing on the surface of the cloth or fabric, the wool, cotton, silk, or other fibrous matter intended to form the nap or pile. I then take wool, cotton, silk, hair, fur, or other fit and proper fibrous matter or material, cut into proper and convenient lengths, and lay or spread it upon or over the surface of the cloth or fabric prepared as hereinbefore mentioned, for the purpose of forming the nap or pile. I then press the cloth or fabric, by means of rollers, brushes, or by any other convenient mode, so as to fix the nap or pile firmly to the surface of the intended cloth or fabric: the cloth or fabric in this state must be hung up to dry, and when it is dry, which will be sooner or later, according to the temperature of the room in which it is placed (the mean time required being about three or four days), I brush the surface of the cloth or fabric so as to remove all the superfluous particles of wool, cotton, silk, &c., which have not become attached to the surface of the cloth or fabric by means of the said last mentioned preparation of India rubber.

In case a woollen material has been used for the nap or pile, the cloth or fabric will then present the appearance of a woollen broadcloth of the ordinary manufacture; and in case a cotton or silk material has been used for the nap or pile, the cloth or fabric will have the appearance of cotton or silk velvet, or other fabric, which have a cut or cropped nap or pile upon their surface.

For common purposes, the cloth or fabric thus prepared,

will not require shearing; but when a particularly even surface is required, it may be sheared in the usual manner of shearing woollen broadcloths.

The cloth made in the manner hereinbefore described, will be especially applicable for outward garments, hammer-cloths, coverings for seats of open carriages, for hangings, druggets, and many other useful purposes.

And I perform the aforesaid processes upon one or both sides of the cloth or fabric, as I may think proper; and, in case I perform the aforesaid processes on both sides of the cloth or fabric, I either make both sides of the same colour, or of different colours: thus, for instance, one side of the cloth or fabric may be made blue, and the other side brown.

I also prepare a cloth, the surface of which shall present a pattern in different colours, as shown in table-covers, ladies' cloaks, and several other articles now in general use. In order to effect this purpose, I prepare a cloth or fabric of wool, cotton, silk, flax, or other similar substance, for receiving and fixing the nap or pile, by covering the surface thereof with the aforesaid preparations of India rubber, in the manner hereinbefore described; I then take blocks such as those used by paper-stainers or calico-printers, a pattern having been cut or carved upon the surface thereof. I then, by means of a resinous varnish, attach woollen or other cloth to the surface of the pattern cut upon the blocks: my object in doing which is, that the cloth upon the surface of the pattern cut upon the blocks may be able to take up and retain a certain quantity of moisture.

I then moisten the surface of the block thus prepared with water, and then press the moistened surface upon a quantity of the material intended to form the nap or pile of the pattern, and a sufficient quantity of such material will then attach itself to the moistened surface of the block. I

then remove the block with the material so attached to it, and press it upon the surface of the cloth or fabric prepared for its reception, as aforesaid. The pressure of the block upon the surface of the cloth or fabric will then cause the material intended to form the nap or pile of the pattern to adhere to the aforesaid preparation of India rubber spread over the surface of the prepared cloth, and the block being removed, will leave the nap or pile fixed to the surface of the cloth or fabric, and will so form the intended pattern. The pattern being thus formed upon the cloth or fabric, I then proceed to cover the remaining uncovered portion thereof, with a material prepared for the nap or pile, and of the colour intended for the ground of the pattern upon the cloth or fabric. I then take the material prepared for the nap or pile of the ground, and lay or spread it over the whole surface of the cloth or fabric; the material so lain or spread over the whole surface will not adhere to those portions of the surface which form or are covered by the pattern, but only to the other portions of the surface which have not been covered with the nap or pile of the pattern. I then press the cloth or fabric, as hereinbefore mentioned, so as to fix the nap or pile firmly to the surface of the intended cloth or fabric, and dry and brush the cloth or fabric in manner aforesaid. By which means I produce a pattern on the cloth clear and distinct, and the cloth may be sheared or not, as beforementioned.

Another mode of producing the pattern on the intended cloth or fabric is, by cutting out the pattern in thin plates or sheets of metal, pasteboard, parchment, or oil cloth, similar to the patterns used by stencillers. I then place the plates or sheets so cut with the pattern upon the surface of the cloth or fabric prepared for receiving the nap or pile, as hereinbefore mentioned; and I take the material prepared for the nap or pile of the pattern, and lay or

spread it through the holes or interstices of the pattern so cut through the said plates or sheets, upon that portion of the surface of the cloth or fabric which is left uncovered by such plates or sheets, which material will adhere to the preparation of India rubber upon the cloth or fabric, as aforesaid, and form the intended pattern: the plates or sheets having been removed, I then proceed to cover the ground of the pattern on the cloth or fabric, as hereinbefore described; and also to press, and dry, and brush, and, if necessary, to shear the cloth or fabric, as hereinbefore mentioned.

I also produce a cloth or fabric with a nap or pile in another manner; (that is to say) I prepare slivers of wool, cotton, hair, fur, or other fit and proper fibrous material for forming the nap or pile, similar to such slivers as are formed by carding engines and other machines used for a similar purpose; and I prefer the slivers to be made of a short wool or fibrous material, mixed with a small portion of long wool or fibrous material, so as to hold the particles of short wool or fibrous material together, in going through the carding engine. The slivers thus made, are to be carefully laid or spread over the whole surface of the cloth or fabric prepared for receiving the nap or pile in the manner hereinbefore described, and then pressed or rolled, so as to fix the slivers firmly to the surface of the cloth or fabric. When the cloth is perfectly dry, I gig, teazle, or brush the surface of the cloth or fabric produced by the sliver, and then shear it in the ordinary manner of shearing woollen cloths, so as to produce an even surface.

In order to produce waterproof hats and caps with a nap or pile on the exterior surface, I make or procure a shape or form of the required fashion for the intended hat or cap, such shape or form being made of felted materials, gauze, woven wire, or any other fit or proper materials for

that purpose. I then prepare the surface of such shape or form for receiving the nap or pile, in the same manner as I prepare the surface of any cloth or fabric to receive the nap or pile, as hereinbefore mentioned or described. But in making the preparation of India rubber to spread over the surface of hats or caps, for receiving and fixing the nap or pile, I prefer using with the India rubber and spirits of turpentine a larger proportion of acetate of lead, litharge, and other sulphate of zinc, gum mastic, or other fit and proper drying material, so as to produce a harder surface, and make the nap or pile adhere more strongly to the surface of the hat or cap, as well as the better to preserve the original shape or fashion of the hat or cap.

The surface of the hat or cap having been prepared for receiving the nap or pile as hereinbefore mentioned, I take wool, cotton, silk, hair, or other fit and proper matter or material cut into proper lengths, and lay or spread it upon or over the surface of the hat or cap prepared as hereinbefore mentioned, for the purpose of forming the nap or pile. The hat or cap is then to be pressed so as to fix the nap or pile firmly to the surface, and is also to be dried, and the surface brushed, so as to remove all superfluous particles of wool, cotton, silk, hair, &c. which have not become attached to the surface of the hat or cap.

And I, the said R. W. Sievier, do hereby declare, that I do not claim as any part of this first branch or object of my invention, the making or rendering of any cloth or fabric, hat or cap, waterproof, by the means or application of India rubber; but I do claim as part of my said invention, the mode of making, forming, or effecting a nap or pile upon the surface of waterproof cloths or fabrics, hats or caps, in the manner hereinbefore described or mentioned.

And I hereby declare, that the second branch or object

of my invention, is to produce elastic waterproof cloths and fabrics, which I effect as hereinafter mentioned.

I produce an elastic waterproof cloth in the following manner; that is to say, I take sheets or pieces of India rubber of about the thickness of one-eighth of an inch, which I stretch both in length and in breadth as far as I think necessary or proper, according to the purpose to which they are intended to be applied. I then spread India rubber, dissolved in spirits of turpentine or other proper solvent, over the surface of the sheet of India rubber; and I take a piece of gauze, strong bobbin-net lace, or any other similar open-work fabric of the same form and dimensions as the sheet or piece of India rubber so stretched, and press it upon the surface of the sheet of India rubber, prepared as hereinbefore mentioned; I then allow the pure sheet of India rubber so stretched to dry, when the gauze, bobbin-net lace, or other similar open work will be firmly fixed to it, and will prevent any over-straining of the India rubber or elastic cloth, and limit its extensibility. I then take India rubber, dissolved in spirits of turpentine or other proper solvent, and I mix therewith a portion of acetate of lead, litharge, sulphate of zinc, gum mastic, or any other proper drying material, as hereinbefore mentioned; and I spread this preparation over the surface of the piece or sheet of India rubber, covered as hereinbefore mentioned. I then take wool, cotton, silk, or other fit and proper fibrous matter or material cut into proper and convenient lengths, as aforesaid, and lay or spread it upon or over the surface of the elastic cloth or sheet of India rubber prepared, as hereinbefore mentioned, for the purpose of forming the nap or pile thereof. I then press the elastic cloth, or sheet of India rubber, by means of a roller, or by any other convenient mode, in order to

fix the nap or pile firmly to the surface in manner aforesaid; after which the said elastic fabric or sheet of India rubber must be dried and brushed, and, if necessary, sheared, as hereinbefore mentioned; and I perform this operation upon one or both of the sides of the piece or sheet of India rubber. The cloth thus formed will be nearly inelastic, the stretching of the piece or sheet of India rubber having temporarily suspended its elastic property. By the application of heat in the usual and well known manner, the elastic property of the India rubber is restored, and the cloth becomes an elastic waterproof fabric.

I also prepare an elastic waterproof fabric, by uniting leather and India rubber, as hereinafter described; that is to say, I prepare pieces or sheets of India rubber, and stretch them in the manner hereinbefore mentioned; I then spread over their surface, in manner aforesaid, India rubber dissolved, as before mentioned; and I take a piece of thin leather, or leather split or pared to a very thin substance, and of the same size and dimensions as the stretched piece or sheet of India rubber, and press it upon the surface of the piece or sheet of India rubber, prepared as hereinbefore mentioned, by a press, weights, or other convenient means, until they are perfectly dry and united, which will require a space of about five or six days. The fabric thus formed will be nearly inelastic, the stretching having temporarily suspended the elastic powers of the India rubber. By the application of heat to about 180 degrees of Fahrenheit's thermometer, the India rubber will partially collapse, and cause the leather to have a corrugated surface similar to Morocco leather. The fabric thus formed will now be both elastic and waterproof, and will be applicable for boots, shoes, belts, and many other useful purposes. I also produce a similar fabric by substituting cloth, or some similar

fabric, in the place of the split or pared leather: and I, the said R. W. Sievier, do hereby declare, that I do not claim as any part of my invention, the mode of dissolving India rubber, the modes of preparing sheets of India rubber, or the mode of spreading preparations of India rubber upon cloth.

Note.—In order to prevent any difficulty in preparing the solution of India rubber mixed with acetate of lead, litharge, sulphate of zinc, or gum mastic, the same may be prepared in the following manner: If acetate of lead and sulphate of zinc are used, they are calcined previously to their being used; but litharge is not to be calcined. In mixing these ingredients with turpentine, I do so in the following proportions: I mix about one ounce of sulphate of zinc, acetate of lead, or litharge, with about a quart of spirits of turpentine, and the mixture must be frequently agitated during the space of several days; after which the sulphate of zinc, acetate of lead, or litharge, is to be allowed to settle, and the spirits of turpentine is to be poured off for use. The spirits of turpentine thus prepared is to be added to a solution of India rubber, or the India rubber may be dissolved in it. In using gum mastic, the gum is to be dissolved in spirits of turpentine, in such quantity as to make it of about the consistence of honey, and from about one-twelfth to one-sixth of that mixture is to be added to and incorporated with the solution of India rubber.—[*Inrolled in the Rolls Chapel Office, June*, 1836.]

To William Coles, *of Charing-cross, in the county of Middlesex, Esq., for his invention of certain improvements in gunnery, and gun and other carriages, and the means of connecting the same.*—[Sealed 14th September, 1837.]

The object to be obtained by my improvement in gunnery, gun carriages, and other carriages, consists in the introduction and arrangement of a new species of ordnance resembling a star, branching off in various directions, each arm forming a gun, which being placed on a pivot, as shown in a two-wheel carriage, together with a display of other ordnance of different calibre; the axes on which it revolves has a tenant working in a groove, and a bolt through it, and also one spiral spring, so fixed, that it permits the guns, when fired, to rebound right or left, whereas the guns upon the frame of the carriage, fig. 11, when fired, rebound and find resistance from an elliptic spring between the cross stays of the carriage. Two other modes of adapting this piece of ordnance will be shown, viz. vertical and horizontal. The first consists of a small platform, having two wheels underneath to revolve sideways; a plug, which is fitted and keyed, or bolted into a universal joint socket, is its axis: the plug may be fixed in many positions on a ship's deck, capstan, cat-head, or timber-head, on a wall, or any other position. There are two spiral springs fitted into two boxes at bottom, and a rope passes through them, and over two pulley wheels at the other end, and hooked on to the centre flange, which carries the gun; the bottom part of the flange has a tenant, and works forward and backward in a mortice or groove in the platform A, and when fired off the springs, allow the guns to rebound and to revert to their former position. An upright frame B, for working the guns in a vertical position, is added to the

above, and bolted through both at bottom, having also a cross stay: the ordnance is bolted through it at the top, when the thimble at the end of the ropes is hooked on to the long frame, the springs allow it to rebound when fired, and to revert to its former position.

My improvements, as shown in the two-wheel carriage, fig. 11, are peculiarly adapted for the protection of railroad property; the large guns, three or four pounders, are bolted to the bed of the carriage; the branch or ordnance gun is placed on its pivot, and by the use of two racks fastened to the frame of the carriage, and a double pinion, two rows of guns of small calibre are lowered at once; the upper row is raised by the hand, whilst the lower is primed and fired; the upper is also lowered and discharged. This instrument, when placed upon a revolving table on a railroad, or on a castle or fort, when well protected from the enemy, would be a terror to the evil-doers.

The object of my invention or improvement in other carriages, more particularly for railways or tramroads, is, in the first place, to reduce the friction upon the axles of the wheels on the rails, and by the introduction of two-wheel carriages, prevent that contact when turning curves upon the rail, to which four-wheel carriages are always liable; secondly, to ameliorate the effects of concussions of such carriages one against the other. The former consists in a novel or improved arrangement of anti-friction wheels or rollers, which bear upon the axles of each other, thereby transferring the weight of the body and its contents from the axle of the quickest motion to that of the slow motion; whilst the latter consists in an improved construction and arrangement of elliptic spring buffers and spring fastenings to connect the same, for the purpose of reducing or ameliorating the concussion of one carriage against the other, or of the engine or tender: all of which improve-

ments are exhibited in the accompanying Plate, as applicable to two-wheel or four-wheel carriages.

Fig. 7, Plate IX., is a side elevation of a four-wheel railway carriage, with my improvements applied thereto; fig. 8, is a plan or horizontal view of the carriage-framing of the same; figs. 9, and 10, represent similar views of the two-wheel carriage: A, A, is the framing of the carriage; B, B, the running wheels, having anti-friction wheels C, C, bearing upon their axle; D, D, are smaller anti-friction wheels, bearing upon the axles of C, C. The axles of the upper wheels are fixed, and do not revolve with the wheels. The middle and lower axles, with their boxes or collars, work up and down in a groove of the framework of the carriage. The whole weight of the load and frame is borne off by the upper friction wheels: E, E, are strong iron bars, which pass through each end of the carriage, and are bolted or attached to an iron which passes through one cross stay, and is thereby connected to the spring buffer; which buffer is also affixed to a similar iron attached to the other cross stay, against which the spring buffers are protected from being too much compressed or elongated, care being taken to allow sufficient room for the action of the springs either way; F, F, the spring buffers; G, G, are two springs, fixed in the cross stay, and pressing against the connecting rod to keep it in a straight line to receive the bolt which connects the carriages; H, H, are two dovetail irons fitted into grooves, with chain to each; and also a bolt, which passes through the end of the carriage and through a coiled spring fitted into a box for that purpose, and connected to the next carriage. This mode of attaching the carriages renders them secure and flexible, and when pulling sideways have always two bearings to draw from, and when going straightforward, three: I, I, I, are three cross stays, to which the springs and the spring buffers are attached; K, K,

are two circular tubes, forming also stays, under which the middle axle works, and through the ends of which the upper axles are screwed and bolted; L, L, are two supports for the upper axles, to confine the wheels in their place, with screws to fix them.

The two-wheel carriage differs from that above described, by having only two cross stays and one spring buffer; the axle of the upper wheels passes through the body of the carriage, and likewise forms a stay for the upper part of the frame.

Having now described the nature of my several inventions or improvements in gunnery, gun carriages, and other carriages, more particularly denominated locomotive carriages for railroads, tramroads, &c., I now claim, first, as my invention, the novel and peculiar adaptation of the guns, platforms, and frame, as aforesaid, and their mode of being worked; and, secondly, I claim, as my invention or improvement in other carriages, the novel and peculiar adaptation of the mode of employing the friction wheels; and, thirdly, the peculiar adaptation of spring buffers and spring fastenings, as shown in the above drawings, or otherwise.—[*Inrolled in the Inrolment Office, March,* 1838.]

To Christopher Nickels, *of Guildford-street, Lambeth, in the county of Surrey, manufacturer of caoutchouc, for improvements in preparing and manufacturing caoutchouc, applicable to various useful purposes, being partly a communication from a foreigner residing abroad.*—[Sealed 24th October, 1836.]

The subjects of invention claimed under this patent, are described under seven heads: first, a mode of producing threads of caoutchouc from the refuse strips or cuttings;

second, machinery for producing the first described object; third, cutting of threads from the edges of a series of discs of caoutchouc; fourth, spirally twisting round strands of caoutchouc, yarns of cotton or silk, or other fibrous materials, for the purpose of guarding the caoutchouc from wear; fifth, rendering fabrics waterproof and air-tight, by means of caoutchouc, without dissolving it; sixth, weaving elastic ornamental webs or fibres; and seventh, the application of caoutchouc to the purposes of binding and covering books.

Under the first head, the Patentee describes the ordinary methods of cutting bottle or cake India rubber into thin strips; and states, that a great waste of the material takes place from the quantity of small pieces which are pared off, and become refuse and useless.

These refuse pieces the Patentee washes in hot water, in order to remove all the dirt, and then introduces into a sort of mill, where they are ground and masticated; and the caoutchouc, after thus treated, is discharged in a plaster, or semi-fluid state. The caoutchouc, so prepared, is then put into a powerful hydraulic press, and kept in that press until it becomes set, and sufficiently hard to be cut into sheets or strips.

The internal form of the receiving vessel of the press is cylindrical, with a corresponding plunger, and therefore the cake of India rubber, when set and hard, assumes a cylindrical shape, which may be readily cut by a knife, or other cutting apparatus, into discs; or the cylindrical vessel may have a cylindrical core in the middle of it, and then the cake, when set, will be of a pipe or hollow cylindrical form, and the pieces sliced off from it will be rings.

The machinery for grinding the India rubber has teeth not much unlike other metallic mills, and by the rotation

of the working parts the material (previously heated) is so worked up as to become one mass. The press may retain the mass or material, as described, until it has become a solid compact cake; or it may be forced out on the side of the press, and passed between rollers, for the purpose of being forced into sheets, and lapped upon a roller. Under this head a machine is described in which the cylindrical block of India rubber may be cut, by means of rotary circular knives, into discs or into rings; the block of India rubber revolving slowly, whilst the circular knives turn rapidly; or the lapped sheets may be cut into tape, by a spiral action of the cutter. The Patentee, however, does not appear to intend claiming the invention of any precise form of machinery, but only a convenient mechanical means of effecting the operation.

Under the third head a machine is described for cutting threads of India rubber from the edges of a series of discs, which may be reduced into fine strands by a drawing process like wire: the fourth head points out the means of coiling threads of cotton, silk, or other material round the strands of India rubber; the fifth, the proposed mode of rendering fabrics waterproof; the sixth, of weaving ornamental elastic fabrics; and the seventh, of applying India rubber, in several ways, to bookbinding. But the Patentee has, since inrolling his specification, found it necessary to disclaim the third, fourth, fifth, sixth, and seventh heads of his invention, as not new at the time of granting his Patent.—[*Inrolled in the Inrolment Office, April,* 1837.]

To John Hopkins, *of Exmouth-street, Clerkenwell, in the county of Middlesex, surveyor, for his invention of improvements in furnaces for steam-engine boilers and other purposes.*—[Sealed 18th June, 1836.]

This invention consists merely of an improved fire bridge of a curved form, constructed in such a manner that the heat and the flames are arrested in their progress and thrown back from the end of the furnace, and in some measure caused to pass again over the surface of the burning fuel; by this means, the vapours arising from the combustion of that part of the fuel which is only partly ignited will be consumed.

In Plate X., fig. 7, represents a longitudinal section taken through a furnace and steam-engine boiler, showing the position of the improved fire bridge, which is represented at *a*, and is constructed of fire brick; it will be seen that the fire bridge, instead of merely intercepting the flames, as in the ordinary construction, and causing the heat to rise upwards and act on the under surface of the boiler, by its bent form, causes the flames and heat to be driven back, and to act more effectually all along the under surface of the boiler.

The Patentee further states, that in marine and some other constructions of boilers, the fire bridge may be constructed of metal, and hollow, for the water of the boiler to pass into and become heated, instead of making it of fire brick.

It will be evident, from the foregoing description, that although the invention has been described as adapted to furnaces of steam-engine boilers only, yet it is equally applicable to the furnaces of other boilers in which bridges of the ordinary construction are used. In conclusion, the Patentee says, "Having now described the nature of my invention, and the manner of carrying the same into effect,

I would have it understood that I claim, as my invention, the construction of the fire bridges of the furnaces of steam-engines and other boilers, as above described, either of fire brick, metal, or other suitable materials.—[*Inrolled in the Inrolment Office, December*, 1836.]

To RICHARD TAPPIN CLARIDGE, *of Salisbury-street, Strand, in the county of Middlesex, gentleman, for the invention of a mastic cement or composition applicable to paving and road-making, covering buildings, and various purposes to which cement, mastic, lead, zinc, or composition are employed, being a communication from a certain foreigner residing abroad.*—[Sealed 25th November, 1837.]

THIS invention consists in a combination, by means of heat, of certain substances, hereinafter described, into a mastic, cement, or composition, applicable to paving and road-making, and various purposes to which cement, mastic, lead, zinc, or composition are employed; and one of such substances is a natural compound, consisting principally of carbonate of lime and bitumen, with a small portion of aqueous and other matter; and such natural compound is commonly called or known by the name of asphalte, or asphaltum, or calcareous asphalte, asphaltic mineral, or asphaltic rock, or asphaltic stone, and such natural compound is hereinafter called asphalte; it is found at Pyrimont, near to Seyssel, in the department de l'Ain, in the kingdom of France, and in other parts of the Jura mountains, and in other places in great abundance; and the other of such substances is bitumen, or mineral, or other pitch; and I do hereby describe the manner in which the said invention is to be performed, by the following statement:—

I take the said asphalte in its native state, as it is extracted in masses from the mine, and I greatly prefer, for the purpose of my invention, the asphalte from Pyrimont, aforesaid; the said asphalte from Pyrimont, aforesaid, contains, in addition to a small portion of aqueous and other matter, carbonate of lime and bitumen, in about the proportion of ninety parts carbonate of lime to about ten parts of bitumen, and the cement formed according to the said invention, from the said asphalte of Pyrimont and bitumen, is better than that formed from any other asphalte which I have yet been able to procure although asphalte is found in other places; and I reduce the asphalte to powder. The asphalte may be reduced to powder solely by mechanical means; but the reduction thereof to powder is facilitated by heat. I usually place the masses of native asphalte in a furnace or oven, the bottom whereof is made of plate iron; in about half an hour, by the application of a brisk fire, the asphalte falls, or is readily reduced to powder. The asphalte, after having been exposed to heat, as above mentioned, or otherwise, or reduced to powder or small parts by mechanical means, is then passed through a sieve, the meshes of which are about one-fourth of an inch square; the asphalte which has passed through such sieve is in a fit state to be mixed with the bitumen, or mineral, or other pitch.

The bitumen or mineral pitch is found in a natural state, combined with an earthy or other matter in great quantities, in the neighbourhood of Pyrimont, and in other places. I have ordinarily used the bitumen found in the neighbourhood of Pyrimont, but the bitumen as found elsewhere may be used without injury to the quality of the cement produced; or other pitch may be used instead of such mineral pitch as aforesaid. The bitumen is freed from its extraneous matter in the ordinary way, in forming the cement or

composition according to the said invention. When I use the asphalte of Pyrimont, and the bitumen or mineral pitch also from the neighbourhood of Pyrimont, I take about ninety-three parts of asphalte reduced to powder, and passed through such sieve as aforesaid, to about from seven to ten parts of such bitumen or mineral pitch.

The quantity of bitumen intended to be used, is first placed in a melting caldron or furnace, and when it is dissolved, the powdered asphalte is added gradually. The mixture is kept carefully stirred, in order that it may not be burnt; and also that the asphalte and bitumen may be perfectly amalgamated, the mixture is kept over the fire, carefully stirred until the whole is thoroughly combined and is nearly fluid: this combination is the mastic cement or composition, according to the said invention.

The melting caldron or furnace should be kept over rather a slow fire until the mixture is nearly in a state of ebullition; it then gives out a light white smoke in jets, and it is fit for use.

When other asphalte is used instead of the asphalte of Pyrimont, the quantity of bitumen to be added will vary according to the particular nature of the asphalte, and the proper quantity will easily be found by trial; and when bitumen or mineral, or other pitch than that from the neighbourhood of Pyrimont, is used, the precise proportions will easily be determined by trial.

In applying the said cement or composition to paving, I add to about every two hundred pounds weight of the nearly fluid mastic cement about half a bucket full of very small, clean, and hot gravel or sand; this is carefully stirred up with the mastic, and as soon as it is sufficiently fluid, that is, as soon as the mastic begins to give out the light white smoke previously described, it is fit for use. It may then be run into moulds and remain until cold, when it will

form blocks or slabs, which may be laid upon any proper foundation; one consisting of concrete and mortar is usually adopted. These blocks or slabs are cemented together by pouring the fluid mastic cement either mixed, as aforesaid, with fine gravel or sand, or without fine gravel or sand, between the interstices of the blocks or slabs: sometimes a thin coating of mastic cement is spread over the foundation, and the blocks or slabs are imbedded therein; in such case, the cement is also poured in between the interstices, as above described.

If it be desired that the pavement should be ornamented so as to present mosaic or other work, the process of forming the blocks or slabs is as follows:—First, a large flat surface is formed, either of wood or plaster, upon which the required pattern is drawn: this surface, or a convenient portion thereof, is enclosed with iron bars of the intended thickness of the slab; over this surface a thin coat of transparent glutinous size is spread: as the following work advances, pebbles of various colours, pieces of porcelain ware, earthenware, glass, or other materials of the required forms and colours, are deposited upon their allotted portions of the pattern, either to represent foliage or fretwork, or any other device: by means of the weak size, they are very lightly retained in their places.

The mastic cement or composition heated as above, and either mixed with fine gravel or sand as aforesaid, or unmixed, is poured into the space enclosed with iron bars as aforesaid; their mastic cement or composition fills up the insterstices between the pebbles, pieces of porcelain ware, earthenware, glass, or other materials, and forms with them a hard slab; this is inverted, and slabs thus formed are cemented together in the same manner as blocks or slabs are previously described to be cemented.

In forming ways or paths I usually proceed thus:—

Upon a proper foundation I place two flat iron bars parallel to each other, at a convenient distance from each other, say from three to four feet; these bars are of the thickness to which the mastic cement or composition is intended to be spread, usually about half an inch thick; between these bars the fluid mastic, or fine gravel, or sand mixed as aforesaid, is poured and spread, and the surface made regular and uniform by passing a thick piece of wood with one straight edge backwards and forwards upon the iron bars. Upon this surface, whilst still in a semi-fluid state, I usually sift fine hot gravel, which I beat into the mastic with wooden stampers; when the mastic is set, the operation is repeated until the surface required for the way or path is covered. As the operation proceeds, the surface of the cement, already set, renders the use of one of the iron bars unnecessary.

I apply the said cement in road-making, either superficially in manner hereinafter mentioned, that is to say, upon the surface of a road formed of the usual materials in the usual way, and the bottom whereof has undergone the usual preparation, I pour the said mastic cement or composition, either with or without fine gravel or sand; when the same is heated just so as to give out the light white smoke aforesaid, and the said mastic cement or composition forms with such stones a hard and compact surface: or I apply the said mastic cement under the hard materials, and in such case I spread a thin coating of the said cement, either mixed with or without fine gravel or sand, between the substratum and the hard materials, for the purpose of preventing the hard materials being injured by the land springs.

In applying the said cement or composition for the purpose of covering buildings, I usually cover the roof with canvass similar to that used by paper-hangers, stretched

tolerably tightly, and upon this canvass I spread a layer of the said mastic cement, heated as last aforesaid, to about the thickness of four-tenths of an inch; and upon the surface of the said mastic, and when the same is in a semi-fluid state, I sift gravel previously heated in a caldron, and, as the mastic sets, I beat the said gravel into the said surface of the said mastic with flat wooden stampers, about fifteen inches long and nine inches broad, until the gravel is incorporated into the substance of the said mastic. The process of applying the said mastic to the lining of tanks, reservoirs, and various purposes to which cement, mastic, lead, zinc, or composition, is employed, is very similar to that previously described; in such linings no gravel or sand is used with the said mastic, but a coating thereof is applied whilst the said mastic is of the heat hereinbefore mentioned, that is to say, when it just begins to give out a white light smoke previously described. For the bottom surface of tanks or reservoirs a simple covering of the said mastic, applied in the manner aforesaid, is sufficient for the sides of such tanks or reservoirs. The face of each brick which is intended to be inwards and exposed to the water, is first covered with a thin coat of the said mastic cement or composition; this is done by laying the bricks side by side on a level of ground, as if they were to form a pavement, then the fluid mastic is thinly spread over their whole surface; as soon as it begins to set, which is in a few seconds, and before it becomes hard, the blade of a large knife is passed between the bricks, cutting the mastic through, at the same time the process leaves each brick with one face covered with the said mastic cement: this done, the walls or sides of the tanks or reservoirs are built, and each brick is set in fluid mastic instead of calcareous mortar or cement, and for greater security, a space of about half an inch is left between the inner and outer

Upon a proper foundation I place tw[illegible] [illegible]anks or reservoirs;
lel to each other, at a convenient [illegible] mastic as the brick-
say from three to four feet; th[illegible] usually adopted.
to which the mastic cemen[illegible] of the application of the
be spread, usually about h[illegible] [illegible]tion, it may easily be applied
bars the fluid mastic, or [illegible] which cement, mastic, lead,
said, is poured and s[illegible] [illegible]ployed.
and uniform by p[illegible] claim as the said invention, the
straight edge b[illegible] said asphalte to powder, or the
Upon this s[illegible] said asphalte, or bitumen, or mineral,
usually sift[illegible] mastic cement or composition. But I
with woo[illegible] said invention, the combination by means
tion is [illegible] [illegible]alte, meaning thereby a natural compound,
path [illegible] [illegible]ncipally of carbonate of lime and bitumen,
the [illegible] portion of aqueous and other matter, by what-
ba[illegible] or names such natural compound be called or
[illegible] and bitumen, or mineral, or other pitch, into a
[illegible] cement or composition applicable to paving and
[illegible]king, and various purposes to which cement, mas-
[illegible], zinc, or composition is employed. And such in-
[illegible]tion being, to the best of my knowledge and belief,
[illegible] new, and never before used within that part of her
said Majesty's United Kingdom of Great Britain and Ire-
land called England, her said Majesty's dominion of Wales, or the town of Berwick-upon-Tweed; I do hereby declare this to be my specification of the same, and that I do verily believe this, my said specification, doth comply in all respects fully, and without reserve or disguise, with the proviso in the said hereinbefore in part recited Letters Patent contained; wherefore, I do hereby claim to maintain exclusive right and privilege to the said invention.—[*Inrolled in the Inrolment Office, May*, 1838.]

SCIENTIFIC NOTICES.

THE REPORT OF MESSRS. COOPER ...ANDE UPON THE EFFICACY OF JOYCE'S ...MING APPARATUS.

Sir,—In compliance with your letter, addressed to me on the 10th of March last, I have undertaken an investigation of Joyce's patent heating apparatus, in relation to its heating powers: the quantity of fuel consumed in a given time, to produce in an appropriate room a certain increase of heat: also the amount of contamination the air of the room sustains in a certain time, as likewise the deterioration of the air by the combustion of oil, tallow, spermaceti, stearine, and gas, with the view of estimating the comparative injurious effects of Joyce's stoves, and of other methods by which heat as well as light are produced; and, also, of the amount of contamination the air undergoes in places where a number of individuals are congregated, and in which no injurious effects are found to occur.

In the outset, I may state that the room in which the experiments have been conducted is nearly 14 feet long, 13 feet wide, and 12 feet high, and, consequently, contains about 2000 cubic feet. It has a chimney, and a peculiarly accurately fitted and well-constructed register stove, which, when shut, effectually closes its lower aperture. Whenever a particular trial was to be made, bags of sand were placed on the junctions of the window sashes, and also at the bottom of the doors, and every precaution taken to make it as air-tight as could be.

I find that one of Joyce's stoves, the internal cylinder of which is 6 inches in diameter and 15 inches high, with an inverted cone having 12 holes, each a quarter of an inch in diameter, burns 3 ounces of the prepared fuel per hour when the regulating apparatus at the top are quite open; in one instance, with a particular kind of fuel (such as is not commonly sold) it burnt 3 ounces and $\frac{4}{10}$ths; but taking the average of a great number of trials carried on for days, its rate of burning is a fraction less than

3 ounces per hour; but, in all cases, the combustion proceeds without producing any of the unpleasant odour that occurs when charcoal of the ordinary kind is burnt in a similar manner.

In one instance the stove was kindled, and at eleven o'clock in the evening was placed in the above-named room, the temperature of which was 62 degrees Fahrenheit; the room was then closed, and not entered till ten o'clock the following morning; I then remained in the room about an hour, and found that exactly 36 ounces, avoirdupois, of the fuel had been consumed, the doors and windows being kept closed; and on testing the air taken from the upper, lower, and middle parts of the room, the greatest quantity of carbonic acid contained was three-quarters per cent., the temperature had increased to 72½ degrees Fahr.

In another experiment, the stove was allowed to burn 15 hours in the closed department, and at the end of that time it had consumed 44½ ounces of fuel; and the air of the room, on being tested for carbonic acid as before, was found to contain less than 1 per cent., and the temperature had increased 13 degrees.

These experiments have been made repeatedly, and always with the same results, excepting some slight differences in the increase of heat.

It can be demonstrated as follows:—that each ounce of pure charcoal, when burnt, will produce a little less than 2 cubic feet of carbonic acid; for 100 cubical inches of carbonic acid is estimated to weigh 47 grains, and every 22 grains of carbonic acid is known to contain 6 grains of carbon: then, as 22 is to 6, so is 47 to 12.82, which is the weight of the carbon contained in 100 cubical inches of carbonic acid; then, if 100 cubical inches of carbonic acid contain 12.82 of carbon, 1728 cubical inches, or 1 cubic foot, will contain 221.53 grains of carbon: again, if 221.53 grains of carbon is contained in 1 cubic foot of carbonic acid, 1 ounce, avoirdupois, or 437.5 grains, will be contained in 1.97 cubic feet, which is so nearly 2 cubic feet that, for my present purpose, it may be said that 1 ounce of pure charcoal will produce 2 cubic feet of carbonic acid.

If no change in the air of the apartment had occurred in the

two cases before related, there should have been present in the first instance 72, and in the latter 89 cubic feet of carbonic acid, which would have made the per centage 3.6 and 4.45; whereas in both cases it was less than 1 per cent., thereby showing that whatever care may be bestowed to render a room air-tight, that it is not possible to accomplish it so completely as to prevent the escape of the warm air through minute pores and crevices from the upper parts of the room, and the entrance of the cooler air at the bottom; for in no other way am I able to account for the difference observed in the quantity of carbonic acid produced, and that detected in the air of the room.

An imperial pint of good sperm oil will burn in a well-trimmed Argand lamp of the ordinary size about twelve hours; but I find by my analysis, that a pint of such oil contains 6333 grains of carbon, or nearly 14.5 ounces avoirdupois, making the quantity of carbon consumed in one hour a trifle more than 1.2 ounces; which, as I have shown above, is equivalent to the production of 2.4 cubic feet of carbonic acid. It will follow from this that two such table lamps burning together will produce nearly as much carbonic acid in the same time, as one of the Joyce's stove, such as I have used in my experiments, and which, as I have before stated, to be adapted for warming an apartment containing about 2000 cubic feet of air.

A moulded tallow candle (long four) burns on the average of some hours 122 grains of tallow per hour; but in 122 grains of tallow there are about 95 grains of carbon; consequently, about 14 such candles burning together would produce as much carbonic acid in the same time as Joyce's stove, to which I have herebefore alluded.

A spermaceti candle of the same size will burn in an hour 129 grains of spermaceti, but in 129 grains of spermaceti there are about 100 grains of carbon; consequently, about 13 such candles burning together will produce in the same time as much carbonic acid as the Joyce's stove.

A stearine candle of the same size will burn in an hour 156 grains of that substance, but in 156 grains of stearine there are

about 121 grains of carbon; consequently, 11 of such candles burning together will produce as much carbonic acid in the same time as the Joyce's stove.

Another stearine candle from a different maker with a larger wick, but of the same weight (long four), will burn 175 grains in an hour; but in 175 grains of stearine there are about 136 grains of carbon; consequently, between nine and ten of such candles burning together will produce as much carbonic acid in the same time as the Joyce's stove.

Coal gas, of average quality, I have found to produce by burning 0.6 of its bulk of carbonic acid; and ordinary coal-gas burners on the Argand principle, having 15 holes, will consume 5 cubic feet of such gas per hour; $\frac{6}{10}$ths of 5 is 3, therefore 3 cubic feet of carbonic acid would result from one such light; consequently, two such gas lights burning together will produce exactly the same quantity of carbonic acid as the Joyce's stove.

But independently of the formation of carbonic acid, all the common combustibles last named contain such excess of hydrogen as tends to the further deterioration of the air by the abstraction of an additional portion of its oxygen, so as to leave an excess of residuary nitrogen, which of itself is nearly as deleterious as carbonic acid. The air, therefore, which issues from the glasses of Argand oil or gas lamps, or from the flames of candles, will, if received into a proper vessel, by which the entire products of combustion may be collected, prove equally, if not more, deleterious to animal life, than that which results from the combustions of an equivalent quantity of charcoal.

With a view to determine the amount of deterioration the air underwent in crowded assemblies, I obtained some air from a chapel in my neighbourhood, towards the close of the evening service, and on examination in the ordinary way, it was found to contain a little more than $1\frac{1}{2}$ per cent. of carbonic acid. In another instance I collected some air from the gallery of a crowded theatre, at eleven o'clock in the evening, about four hours after the commencement of the performances, and this I have found to contain about 3 per cent. of carbonic acid.

The advantage which I conceive Joyce's stove to possess over the ordinary methods of burning charcoal for warming apartments, is the perfect control over the rate of combustion of the fuel; for, while, in a common chaffing-dish, or brazier, almost an unlimited quantity of charcoal may be consumed in a comparatively short space of time, and liberate very suddenly a large volume of carbonic acid, which might be prejudicial to health, if not absolutely dangerous, in these stoves, by their peculiar construction and arrangement of proper-sized apertures, the fuel can be consumed only at a certain given rate; and if they are properly adjusted to the size of the apartment they are intended to heat, my experience leads me to believe that no injurious consequences can arise from their employment.

JOHN THOMAS COOPER,

To Mr. W. Harper. 82, Blackfriars-road, London,
14th June, 1838.

Having been present at the experiments made at Mr. Cooper's house, with a view of determining the degree of deterioration which the air suffers by the employment of Joyce's stoves in close rooms, and having examined, in conjunction with him, the compositions of the atmosphere under such circumstances, I can certify that, after burning for twelve hours in a close room of the dimensions above stated, that less than 1 per cent. of carbonic acid was in all cases found in the air of the room; that such proportions of carbonic acid cannot be considered as deleterious, or in the least degree dangerous, in reference to respiration; that it falls short of the relative quantity of carbonic acid found in crowded and illuminated rooms, or in buildings in which many persons are congregated—such as churches, theatres, and assembly rooms, in which ventilation is generally imperfect, and in which, as far as my experience goes, the relative proportion of carbonic acid always considerably exceeds 1 per cent. I am therefore of opinion that the said stoves, which are so constructed as to consume only a limited quantity of pure charcoal in a given time,

may be employed with perfect security for all the purposes for which they have been proposed; and I consider the grounds of this opinion sufficiently detailed by the experiments above given.

WILLIAM THOMAS BRANDE,

To Mr. W. Harper. London, 14th June, 1838.

REPORT OF TRANSACTIONS OF THE INSTITUTION OF CIVIL ENGINEERS.

January 9, 1838.

W. Cubitt, Esq., V. P., in the chair.

"On Captain Huddart's Improvements in Rope Machinery. By W. Cotton."

The attention of the late Captain Huddart was directed to the subject of rope-making, from observing every morning during a voyage, that some of the external yarns of a ship's cable were broken.

This was evidently to be attributed to the additional strain which the outer yarns experienced in the process of twisting, the yarns being all originally of the same length. It was proposed to obviate this defect by giving to all the yarns an increased length in proportion to the distance of the yarn from the centre of the strand, and to the angle at which it was laid. The success which attended these efforts induced Captain Huddart to construct the large laying machine, which was found to answer completely, and to give to each strand its proper length and proper degree of twist, and to preserve throughout the longest rope the same press and the same angle.

The paper contains some historical notices respecting the establishment of the extensive works of Huddart and Co. at Limehouse, and the various stages of improvement. Several pieces of strand, to illustrate the foregoing principles, were presented, as also a piece of the twenty-two-inch cable made for the East India Company's ship Waterloo; a strand of the long rope made for

the London and Birmingham Railway; and some cards containing the comparative strength of the warm and cold, registered and common, cordage.

The distinguished individual of whose improvements in rope machinery a brief account has here been given, was born at Allenby, in Cumberland, in 1741, and died in 1816, after a life devoted to the pursuit of those scientific researches for which his rare talents so eminently qualified him.

In the strands, as constructed on this principle, the strain on all the yarns will be the same so long as the original degree of twist is preserved; but if the strand become untwisted, there is an extra strain on the internal yarns; if more tightly twisted, on the external yarns; several strands, however, being worked together in a cable, the twisting or untwisting of each particular one is prevented.

"On the Cornish Engines. By Thomas Wicksteed, M. Inst. C. E."

In this communication, Mr. Wicksteed gives an account of several trials which he made on some engines in Cornwall. In a trial of the engine upon the Holmbush Mines, the water was delivered into a cistern and weighed, and the result obtained by an experiment was 102,721,323 lbs. raised one foot high with ninety-four pounds of coal: this was the quantity raised and delivered. The quantity raised does not, however, express the duty of the engine, which must be calculated according to the contents of the pumps and the atmospheric column, without any allowance for leakage. According to this calculation, the duty would be nearly 118 millions; namely, 117,906,992 lbs. raised one foot high with ninety-four pounds of coal.

Another calculation is then given, founded on the law of Boyle, that the pressure of the steam is inversely as the space occupied. The steam was cut off at one-sixth of the stroke, and the temperature in the jacket was fully maintained by free communication with the boiler. The mean pressure of the steam being (on the

above law) 17.66 lbs. on the square inch, the power of steam would be 211,658,700 lbs. Now, as the duty would be 117,906,992, we have 93,751,710 for the friction of the machinery, or about $7\frac{3}{4}$ lbs. per square inch; which is about two pounds more than the friction of a water-works pumping engine.

Mr. Wicksteed also made trial of a double engine at the Tincroft Mines working stamps, cutting off the down-stroke at two-fifths, and in the up-stroke at one-third. The duty of this engine was 56,525,072.

The coals consumed by the Tincroft engines amounted only to 1.57 lbs. per horse power per hour; whereas, in an experiment at Oldford, the quantity was 4.82 lbs. notwithstanding the additional friction in the former case of the mining engine. The consumption is stated by Mr. Farey, in his Treatise on the Steam-engine, for a double engine (Boulton and Watt) at $10\frac{1}{2}$ lbs. per horse power per hour.

At the end of the paper are two tables, the one showing the gradual improvement of the steam-engine during sixty-six years, and the other the average duty of engines in Cornwall, for 1835 and 1836. The improvement has been progressive from 1769 up to the present time; and it appears, on the authority of Mr. John Taylor, that on comparing the water raised and the coals consumed from 1799 to 1828, at different mines, there is a saving on the books of the mines proportionate to the improvements stated to have been made during these periods in the working of the engine.

Some discussion then took place on the weight of the bushel of coals, Mr. Lowe stating that he had never known a bushel of Newcastle coals to weigh more than 84 lbs. Mr. Price stated, that the Welsh coal, which was chiefly used in Cornwall, was very heavy, and he had known a heaped-up bushel to weigh 101 lbs. The weight of the bushel of Newcastle coals was considered as varying from 80 to 84 lbs.

January 30, 1838.

The PRESIDENT in the chair.

"On Locomotive Engines. By Edward Woods."

The first engines employed on the Liverpool and Manchester Railway, were found to require strengthening in almost every part. The increase of weight from five tons to seven tons, consequent on staying the inner and outer framings in every part, on replacing wooden by iron wheels, and of nearly doubling the quantity of material in the axles, piston rods, &c., rendered the engines too heavy for the road, which was formed to sustain a moving mass of not more than four tons and a half, on four wheels. The weights being still farther increased, it became necessary to re-lay the whole line, and, as a temporary expedient, to place props under the rails, and to add a third pair of wheels behind the fire box. The author then details certain necessary conditions in the structure of locomotives, and the means successfully adopted to obviate the rocking motion and the unsteadiness arising from lateral undulations; also other important practical results, which time developed.

The utility of an outside framing, and the practical advantages as regards steadiness in the motion and diminution of the injurious tendencies of concussion, are then considered. With respect to the objections urged against the use of six-wheeled carriages, that they have less adhesion than four-wheeled carriages; that the axle and weight detract from the available power; that the friction and strain are increased in traversing curves—the author observes, that the adhesion, though less, is sufficient; that the additional weight does not exceed 12 cwt., or produce a diminution in the tractive power amounting to more than $\frac{1}{200}$th of the whole; and that the strain and friction are entirely obviated by making the plummer blocks of the hind wheels light and elastic, so that they will readily yield sideways. The usual weight of the engines now in use on the Liverpool and Manchester Railway is about eleven and a half tons, and distributed as follows:—four and a half tons on the fore wheels, five tons on the driving wheels, two tons on the hinder wheels.

"On Improvements in Water Wheels. By Isaac Dodds."

The author having made many experiments with the view o removing the evils produced by back-water upon water wheels, was led to propose, as a remedy, that the wheel should be raised or lowered by means of two air vessels, which form the sides or water-guides to the wheel, as well as carry the weight of the machinery. These being properly ballasted, any required dip may be given to the wash boards. The race is so adapted that the dam head may be raised in the same proportion as the back-water, or more or less. The paper is accompanied by a plan and sections of the proposed machinery.

It was remarked, that the cases to which the proposed method would be applicable, are not of common occurrence in this country, as it is necessary that the head and tail should rise by the same amount. It generally happens that the tail rises more than the head. It is also only applicable to undershot wheels, which are seldom used except in cases of superabundance of water. The best practical rule for the engineer is, to give to the water wheel superabundant capacity, and to make it go very slow.

Mr. Brunel then gave an account of the new Poling Boards which he is employing for the effectual protection of the shield at the Thames Tunnel. These constitute a system of panelling, of which every one, though it can be easily moved, is secured to its neighbour. Thus the boards cannot be displaced, and a most efficient auxiliary is provided against the loose portions of ground in front of the shield. The application of these appears to have added every thing that was wanted to render the shield a perfect protection in all operations of a nature similar to those which are now going on at the Tunnel.

February 6, 1838.

The PRESIDENT in the chair.

"On the Construction of Flat Roofs with Earthenware Pots. By F. W. Simms."

Mr. Simms details the construction of the roof of the Manu-

tention des Vivres de la Guerre, quai de Billy, Paris, formed of earthenware pots, and entirely without timber. This roof, which forms a flat terrace, having only inclination sufficient to carry off the water, is constructed with pots of about nine inches long, and five inches in diameter, nearly cylindrical, and closed at both ends; one end being finished off nearly square. The soffits of the arches are covered with plaster, and form ceilings. The extrados of the arch is covered with Beton, composed of lime, sand, and gravel, of such thickness as to give the inclination requisite for carrying off the water; on this is laid a thin coating of hydraulic mortar, over which, when dry, canvass is stretched tight, and upon the canvass Asphaltic Mastic is poured in a semi-fluid state, which forms the finished surface of the terraced roof.

The paper was accompanied with a plan and section of the roof so constructed. The strength of part of this roof had been tested during its construction, and was found to bear six tons without yielding; it had also suffered no injury from the fall of a stack of chimneys upon it, excepting some bruises in the mastic, which were readily repaired.

Mr. Simms presented one of the pots employed, and exhibited several specimens of the Asphaltic Mastic in its manufactured state. He also exhibited some pieces of pots fastened together by the mastic, which had resisted great efforts to separate them.

The Asphaltic Mastic is obtained from Pyrimont, near Seyssel, and brought down the Rhone, and is a compound of a carbonate of lime an mineral pitch. After being roasted on an iron plate it falls to powder, or may be readily pounded. By roasting it loses about one-fortieth of its weight. It is composed of nearly pure carbonate of lime, with about nine or ten per cent. of bitumen.

When in a state of powder it is mixed with about seven per cent. of a bitumen or mineral pitch, found near the same spot. This bitumen appears to give ductility to the mastic. The addition of only one per cent. of sulphur makes it exceedingly brittle. The powdered Asphaltic is added to the bitumen when in a

melting state; also a quantity of clean gravel, to give it a proper consistency for pouring it into moulds. When laid down for pavement, small stones are sifted on, and this sifting is not observed to wear off. The mass is partially elastic, and Mr. Simms had seen a case in which a wall having fallen away the Asphaltic stretched, and did not crack. It may be considered as a species of mineral leather. The sun and rain do not appear to have any effect upon it; it answers exceedingly well for the floors of the abattoirs of the barracks, and keeps the vermin down; and is uninjured by the kicking of the horses feet. It may be laid down at from eightpence to ninepence per square foot.

List of Patents

Granted in Scotland between 22d May and 22d June, 1838.

To William Neale Clay, of West Bromwich, in the county of Stafford, manufacturing chemist, for an invention of improvements in the manufacture of iron.—23d May.

— Charles Hullmandel, of Great Marlborough-street, in the parish of St. James, Westminster, in the county of Middlesex, lithographic printer, for an invention of a new mode of preparing certain surfaces for being corroded with acids, in order to produce patterns and designs for the purpose of certain kinds of printing and transparencies.—23d May.

— Jeremiah Grime, of Bury, in the county of Lancaster, engraver, for an invention of certain improvements in manufacturing wheels, which are applicable to locomotive engines, tenders, and carriages, and to running wheels for other useful purposes, and also in the apparatus for constructing the same. —23d May.

— John Upton, of Battersea, in the county of Surrey, engineer, for an invention of an improved method or methods of generating steam power, and applying the same to ploughing, harrowing, and other agricultural purposes, which method or

methods is or are also applicable to other purposes to which the power of steam is or may be applied.—23d May.

To James Hill, of Staleybridge, in the county of Chester, cotton-spinner, for an invention of a certain apparatus applicable to machinery used in the preparation of cotton, and other fibrous materials, for the purpose of spinning.—29th May.

— Edmund Shaw, of Fenchurch-street, in the city of London, stationer, in consequence of a communication made to him by a certain foreigner residing abroad, for an invention of improvements in the manufacture of paper and paper-boards.—29th May.

— Alexandre Happey, of Basing-lane, in the city of London, gentleman, in consequence of a communication made to him by a certain foreigner residing abroad, for an invention of a new and improved method of extracting tar and bitumen from all matters which contain these substances, or either of them. —29th May.

— William Ketland Izon, of Cambridge, for an invention of improvements applicable to steam-engines.—29th May.

— John Wilson, the younger, of Hurlet, in the county of Renfrew, North Britain, coal-master, for an invention of an improved process of manufacturing Prussian blue, prussiate of potash, and prussiate of soda, and other substances into which prussine or cyanogenentors is a constituent.—1st June.

— Thomas Hancock, of Goswell-mews, in the county of Middlesex, patent waterproof cloth-manufacturer, for an invention of improvements in the method of manufacturing or preparing caoutchouc, either alone or in combination with other substances.—5th June.

— Francis Sleddon, of Preston, in the county of Lancaster, machine-maker, for an invention of certain improvements in machinery or apparatus for spinning and doubling cotton, silk, flax, wool, and other fibrous substances.—5th June.

— Robert Thomas, of 36, St. James's-street, in the city of Westminster and county of Middlesex, boot-maker, for an invention of certain improvements in apparatus to be attached

to carriages for the purpose of preventing horses from starting, and for stopping or restraining them when running away or descending hills.—5th June.

To Charles Button, of Holborn-bars, chemist, and Harris Grey Dyar, of Mortimer-street, Cavendish-square, both in the county of Middlesex, gentlemen, for an invention of improvements in the manufacture of white lead.—7th June.

— John Potter, of Ancoats, Manchester, spinner, for an invention of an improvement or improvements in the process of preparing certain descriptions of warps for the loom.—7th June.

— William Neale Clay, of West Bromwich, in the county of Stafford, manufacturing chemist, and Joseph Denham Smith, of St. Thomas's Hospital, in the borough of Southwark, student in chemistry, for an invention of certain improvements in the manufacture of glass.—7th June.

— Samuel Clegg, of Sidmouth-street, Gray's-inn, in the county of Middlesex, engineer, for an invention of improvements in gas-meters.—7th June.

— John Melville, of Upper Harley-street, in the county of Middlesex, Esquire, for an invention of improvements in the generation of steam, and in propelling vessels by steam or other power.—11th June.

— Miles Berry, of the Office for Patents, Chancery-lane, in the county of Middlesex, patent agent and mechanical draftsman, in consequence of a communication from a foreigner residing abroad, for an invention of certain improvements in the means of economising heat and fuel in furnaces or closed fire-places. —15th June.

— David Cheetham, junior, of Hollinsmill, Staleybridge, in the county of Chester, cotton-spinner, for an invention of certain improvements in the machinery applicable to the preparation of cotton and other fibrous substances for the purposes of spinning.—15th June.

— Edmund Butler Rowley, of Chorlton-upon-Medlock, in the parish of Manchester, and county of Lancaster, surgeon, for

an invention of certain improvements applicable to locomotive engines, tenders, and carriages to be used upon railways, and which improvements are also applicable to other useful purposes.—19th June.

To William Sanford Hall, of Strathearn Cottage, Chelsea, in the county of Middlesex, lieutenant (on half-pay) in her Majesty's royal army, for an invention of improvements in paddle-wheels.—21st June.

— Joseph Rock Cooper, of Birmingham, in the county of Warwick, gun-maker, for an invention of improvements in fire-arms.—21st June.

— John William Fraser, of Arundel-street, Strand, in the county of Middlesex, for an invention of improvements in diving or descending and working in water, and for raising or floating sunken and stranded vessels, and other bodies.—21st June.

New Patents
SEALED IN ENGLAND.
1838.

To Thomas Ridgway Bridson, of Great Bolton, in the county of Lancaster, bleacher, and William Latham, of Little Bolton, in the same county, machine maker, for their invention of certain improvements in machinery or apparatus for stretching, drying, and finishing woven fabrics.—Sealed 26th May—6 months for inrolment.

To Stephen Geary, of Hamilton-place, New-road, in the county of Middlesex, architect, for his invention of improvements in the preparation of fuel.—Sealed 26th May —6 months for inrolment.

To Thomas Ridgway Bridson, of Great Bolton, in the county of Lancaster, bleacher, for his invention of certain improvements in the construction and arrangement of

machinery or apparatus for stretching, mangling, drying, and finishing woven goods and fabrics, and part or parts of which improvements are applicable to other useful purposes.—Sealed 29th May—6 months for inrolment.

To Miles Berry, of the Office for Patents, Chancery-lane, patent-agent and mechanical draftsman, for certain improvements in the means of economizing heat and fuel in furnaces or closed fire-places, being a communication from a foreigner residing abroad.—Sealed 31st May—6 months for inrolment.

To Joshua Wordsworth, of Leeds, in the county of York, machine-maker, for his invention of certain improvements in machinery for heckling and dressing flax, hemp, and other fibrous materials.—Sealed 31st May—6 months for inrolment.

To Peter Walker, of Liverpool, in the county of Lancaster, brewer, for his invention of an improved apparatus to be used in cleansing beer or other fermented liquors.—Sealed 31st May—6 months for inrolment.

To Luke Hebert, of Camden-town, in the county of Middlesex, civil engineer, for a new and improved method or methods of uniting or soldering metallic substances.—Sealed 31st May—6 months for inrolment.

To George Nussey, of Leeds, in the county of York, dyer, for his invention of a new vegetable preparation applicable to dyeing blues and other colours.—Sealed 31st May—6 months for inrolment.

To William Rattray, of Aberdeen, North Britain, manufacturing chemist, for his invention of certain improvements in the manufacture of the preparations called gelatine size and glue.—Sealed 31st May—6 months for inrolment.

To Edouard François Joseph Duclos, late of Samson, in the kingdom of Belgium, but now of Church, in the county

of Lancaster, gentleman, for his invention of improvements in the manufacture of zinc, copper, tin, and antimony.—Sealed 31st May—6 months for inrolment.

To William Needham, of Manchester, in the county of Lancaster, gentleman, for his invention of an improved machine called the silkworm, for the purpose of spinning, twisting, and doubling silk.—Sealed 31st May—6 months for inrolment.

To Nicholas Raper, of Greek-street, Soho, in the county of Middlesex, gentleman, for his invention of improvements in rendering fabrics and leather waterproof.—Sealed 31st May—6 months for inrolment.

To Thomas Walker, of Birmingham, in the county of Warwick, clock-maker, for his invention of improvements in steam-engines.—Sealed 31st May—6 months for inrolment.

To James Hardy, of Wednesbury, in the county of Stafford, iron-master, for his invention of certain improvements in rolling, making, or manufacturing shafts, rails, fire iron, and various other heavy articles of metal, and in the machinery or apparatus used in the same.—Sealed 2nd June—6 months for inrolment.

To Joseph Green, of Ranelagh-grove, Chelsea, in the county of Middlesex, gentleman, for his invention of an improvement in ovens.—Sealed 2nd June—6 months for inrolment.

To Francis Sleddon, of Preston, in the county of Lancaster, machine-maker, for his invention of certain improvements in the machinery or apparatus for spinning and doubling cotton, silk, flax, wool, and other fibrous substances.—Sealed 2nd June—6 months for inrolment.

To David Cheetham, junior, of Hollins-mill, Staley-

bridge, in the county of Chester, cotton-spinner, for his invention of certain improvements in the machinery applicable to the preparation of cotton and other fibrous substances for the purpose of spinning.—Sealed 5th June—6 months for inrolment.

To Richard Thomas Beck, of the parish of Little Stonham, in the county of Suffolk, gentleman, for new or improved apparatus or mechanism for obtaining power and motion, to be used as a mechanical agent generally, which he intends to denominate rotæ vivæ.—Sealed 5th June—6 months for inrolment.

To Samuel Parlour, of Croydon, in the county of Surrey, gentleman, for his invention of improvements in paddle-wheels, and in communicating rotary motion from steam or other power where change of speed and power are required.—Sealed 5th June—6 months for inrolment.

To Thomas Hammond Fiske, of Portsmouth, in the county of Hants, watch and clock maker, for his invention of improvements in apparatus for measuring and indicating the depth of water in a ship's hold.—Sealed 5th June—6 months for inrolment.

To Charles Knight, of Ludgate-street, in the city of London, bookseller and publisher, for his invention of improvements in the process and in the apparatus used in the production of coloured impressions on paper, vellum, parchment, and pasteboard, by surface printing.—Sealed 7th June—6 months for inrolment.

To Samuel Clegg, of Sidmouth-street, Gray's Inn-road, in the county of Middlesex, engineer, for his invention of improvements in gas meters.—Sealed 7th June—6 months for inrolment.

To John Coope Haddan, of Duke-street, Westminster,

in the county of Middlesex, gentleman, and John Johnson, of Cursitor-street, Chancery-lane, in the city of London, brass-founder, for their invention of certain improvements in warming, in lighting, and in ventilating.—Sealed 7th June—6 months for inrolment.

To Herman Kessels, major in the Belgian artillery, and knight of several military orders, but now residing in St. Mary Axe, in the city of London, for his invention of certain new and improved means or apparatus for the saving of lives and property from fire, which he denominates the salvator.—Sealed 7th June—6 months for inrolment.

To Robert Thomas, of No. 36, St. James's-street, in the city of Westminster and county of Middlesex, boot-maker, for his invention of certain improvements in apparatus to be attached to carriages for the purpose of preventing horses from starting, and for stopping or restraining them when running away or descending hills.—Sealed 7th June —6 months for inrolment.

To Edward John Massey, of Liverpool, in the county of Lancaster, watch-maker, for his invention of certain improvements in chronometers and other time-keepers.—Sealed 9th June—6 months for inrolment.

To Archibald Richardson, of Hackney, in the county of Middlesex, distiller and wine-merchant, for his invention of a new and improved mode of producing a pure spirit from malt and all kinds of grain, and from vegetable substances of every description containing saccharine matters. —Sealed 12th June—6 months for inrolment.

To James Reed, of Bishop's Stortford, in the county of Hertford, stone-mason, for his invention of improvements in joining slate, stone, and marble for cisterns and other purposes.—Sealed 12th June—6 months for inrolment.

To Benjamin Ledger Shaw, of Henley, near Huddersfield, in the county of York, clothier, for his invention of improvements in preparing wool for, and in the manufacture and finishing of woollen cloth, part of which improvements are applicable to the weaving and stretching of other fabrics.—Sealed 12th June—6 months for inrolment.

To Samuel Parker, of Argyle-place, in the county of Middlesex, lamp-maker, for his invention of improvements in lamps and apparatus connected therewith.—Sealed 12th June—6 months for inrolment.

To Richard March Hoe, late of New York, in the United States of America, but now residing at the Office for Patents, Chancery-lane, in the county of Middlesex, civil-engineer, for his invention of certain improvements in machinery or apparatus for grinding and polishing metal surfaces.—Sealed 12th June—6 months for inrolment.

To Richard March Hoe, late of New York, in the United States of America, but now residing at the Office for Patents, Chancery-lane, in the county of Middlesex, civil-engineer, for certain improvements in machinery or tools and apparatus for chipping, levelling, smoothing, and polishing the surface of stone, slate, or such other materials.—12th June—6 months for inrolment.

To Henry Robert Abraham, of Keppel-street, in the parish of St. George, Bloomsbury, and county of Middlesex, civil-engineer and architect, for his invention of new or improved apparatus for regulating the supply of water or other liquids, and the quantity delivered into receivers.—Sealed 14th June—6 months for inrolment.

To Joseph Winter, of Fountain-court, Cheapside, in the city of London, glover, for his invention of improvements in painting, printing, or otherwise ornamenting the surface

of leather, silk, cotton, or linen, which improvements are particularly applicable to the manufacture of gloves, stockings, and such like articles.—Sealed 14th June—6 months for inrolment.

To Joseph Bolton Doe, of Hope-street, Whitechapel, in the county of Middlesex, iron-founder, for his invention of certain improvements in apparatus used in the manufacture of soap.—Sealed 14th June—6 months for inrolment.

To Henry Davies, of Wednesbury, in the county of Stafford, engineer, for his invention of certain improvements in engines or machines to be used for obtaining mechanical power, also for raising or impelling fluids.—Sealed 14th June—6 months for inrolment.

To Joseph Bunnett, of Deptford, in the county of Kent, engineer, for his invention of improvements in steam-engines.—Sealed 14th June—6 months for inrolment.

To George Price, of Cornhill, in the city of London, Esq., for improvements in clarifying water and other liquids, being a communication from a foreigner residing abroad.—Sealed 14th June—6 months for inrolment.

To Richard Goodridge, of No. 7, Bell's-buildings, Salisbury-square, in the city of London, purser in her Majesty's Navy, for his invention of a new or improved apparatus for lifting or raising fluids on water or on land, and for marine propelling purposes, without steam.—Sealed 14th June—6 months for inrolment.

To John White, of the New-road, in the parish of St. Marylebone, and county of Middlesex, architect, for his invention of certain improvements in the construction of railroads, bridges, and viaducts.—Sealed 18th June—6 months for inrolment.

To William Gossage, of Stoke Prior, in the county of

Worcester, manufacturing chemist, for his invention of certain improvements in manufacturing iron.—Sealed 18th June—6 months for inrolment.

To William Garnett, of Haslingden, in the county of Lancaster, dyer, for certain improvements in machinery for spinning and doubling wool, flax, cotton, silk, and other fibrous materials, being a communication from a foreigner residing abroad.—Sealed 19th June—6 months for inrolment.

To William Edward Newton, of the Office for Patents, Chancery-lane, in the county of Middlesex, mechanical draftsman, for improvements in diving apparatus, being a communication from a foreigner residing abroad.—Sealed 19th June—6 months for inrolment.

To John William Fraser, of Arundel-street, Strand, in the county of Middlesex, for his invention of improvements in raising or floating sunken and stranded vessels and other bodies.—Sealed 22nd June—6 months for inrolment.

To Eliezer Chater Wilson, of Skinner-street, Snow-hill, in the city of London, printer, for improvements in evaporation, being a communication from a foreigner residing abroad.—Sealed 22nd June—6 months for inrolment.

To Thomas Joyce, of Camberwell New-road, in the county of Surrey, gardener, for his invention of certain improvements in the mode of erecting, heating, and ventilating buildings.—Sealed 22nd June—6 months for inrolment.

To Peter Fairbairn, of Leeds, in the county of York, machine-maker, for certain improvements in looms for weaving ribbons, tapes, and other fabrics, being a commu-

nication from a foreigner residing abroad.—Sealed 22nd June—6 months for inrolment.

To Peter Fairbairn, of Leeds, in the county of York, machine-maker, for his invention of certain improvements in the machinery or apparatus for roving, spinning, doubling and twisting cotton, flax, wool, silk, or other fibrous substances.—Sealed 22nd June—6 months for inrolment.

To Robert Sandiford, of Tottington Lower End, in the county of Lancaster, block printer, for his invention of certain improvements in the art of block printing, and in certain arrangements connected therewith.—Sealed 22nd June—6 months for inrolment.

To Nathaniel John Larkin, of Wellington-street, Pentonville, in the county of Middlesex, gentleman, for his invention of improvements in machinery for cutting corks and bungs.—Sealed 23d June—6 months for inrolment.

To George Holworthy Palmer, of New-cross, in the parish of Deptford, in the county of Kent, civil engineer, for his invention of certain improvements in steam generators and engines applicable to locomotive and stationary uses, and in the carriages to be used therewith and otherwise.—Sealed 25th June—6 months for inrolment.

To Edward White Benson, of Birmingham, in the county of Warwick, manufacturing chemist, for his invention of certain improvements in the manufacture of carbonate of lead.—Sealed 27th June—6 months for inrolment.

To James Robinson, of Huddersfield, in the county of York, merchant, for his invention of an improved method of producing, by dyeing, various colours in woollen, worsted, cotton, silk, and other cloths.—Sealed 27th June—6 months for inrolment.

CELESTIAL PHENOMENA, FOR JULY, 1838.

D.	H.	M.	
1			Clock before the sun, 3m. 22s.
—			☽ rises 2h. 0m. A.
—			☽ passes mer. 7h. 6m. A.
—			☽ sets morn.
2	6	5	☿ in the ascending node
3	8	9	♄ in conj. with the ☽ diff. of dec. 5. 59. N.
5			Clock before the sun, 4m. 6s.
—			☽ rises 7h. 12m. A.
—			☽ passes mer. 10h. 29m. A.
—			☽ sets 1h. 2m. M.
6	19	43	☿ in Perihelion.
7	2	19	Ecliptic oppo. or ○ full moon.
9			Occul. κ Capri, im. 10h. 54m., em. 11h. 59m.
10			Clock before the sun, 4m. 54s.
—			☽ rises 10h. 21m. A.
—			☽ passes mer. 2h. 28m. M.
—			☽ sets 7h. 3m. M.
	6		☽ in Perigee.
11	0	30	♅ in conj. with the ☽ diff. of dec. 1. 31. N.
	16	54	Pallas in conj. with ☿ diff. of dec. 22. 36. S.
12	12	9	☿ in sup. conj. with the ☉
	15	35	Ceres in conj. with ☿ diff. of dec. 1. 34. S.
13			Occul. ζ Piscium, im. 12h. 6m., em. 12h. 50m.
14	5	15	Vesta in conj. with ♀ diff. of dec. 2. 4. S.
	7	20	☽ in □ or last quarter.
15			Clock before the sun, 5m. 32s.
—			☽ rises 11h. 31m. A.
—			☽ passes mer. 6h. 36m. M.
—			☽ sets 2h. 19m. A.
16			Mer. R. A. 7h. 59m. dec. 22. 22. N.
—			Venus R. A. 4h. 59m. dec. 20. 55. N.
—			Mars R. A. 5h. 21m. dec. 23. 25. N.
—			Vesta R. A. 4h. 53m. dec. 18. 39. N.
—			Juno R. A. 17h. 23m. dec. 5. 14. S.
—			Pallas R. A. 7h. 30m. dec. 0. 57. N.
16			Ceres R. A. 8h. 35m. dec. 24. 30. N.
—			Jupiter R. A. 11h. 8m. dec. 6. 45. N.
—			Saturn R. A. 15h. 21m. dec. 16. 16. S.
—			Georg. R. A. 22h. 55m. dec. 7. 45. S.
—			Mercury passes mer. 0h. 24m.
—			Venus passes mer. 21h. 24m.
—			Mars passes mer. 21h. 45m.
—			Jupiter passes mer. 3h. 32m.
—			Saturn passes mer. 7h. 45m.
17	3	31	☿ greatest hel. lat. N.
18			Pallas in conj. with the ☉
		27	♀ in conj. with the ☽ diff. of dec. 6. 30. S.
			Occul. C in Tauri, im. 13h. 10m., em. 13h. 57m.
	8	28	♂ in conj. with the ☽ diff. of dec. 4. 37. S.
20			Clock before the ☉ 5m. 57s.
—			☽ rises 2h. 6m. M.
—			☽ passes mer. 11h. 12m. M.
—			☽ sets 8h. 8m. A.
21	2	22	Ecliptic conj. or ● new moon.
	22	36	☿ in conj. with the ☽ diff. of dec. 3. 35. S.
25			Clock before the sun, 6m. 8s.
—			☽ rises 7h. 3m. M.
—			☽ passes mer. 2h. 24m. A.
—			☽ sets 9h. 27m. A.
	2	23	♃ in conj. with the ☽ diff. of dec. 0. 35. S.
26	1		☽ in Apogee.
27	2	9	♀ in conj. with ♂ diff. of dec. 1. 40. S.
	5	54	♄ stationary.
29	9	55	☽ in □ or first quarter.
30	16	15	♄ in conj. with the ☽ diff. of dec. 6. 4. N.
—			Clock before the sun, 6m. 6s.
—			☽ rises 2h. 12m. A.
—			☽ passes mer. 6h. 29m. A.
—			☽ sets 10h. 35m. A.
31			Occul. in Scorpii, im. 9h. 0m., em. 10h. 15m.

The Eclipses of Jupiter's Satellites are not visible at Greenwich this month.

J. LEWTHWAITE, Rotherhithe.

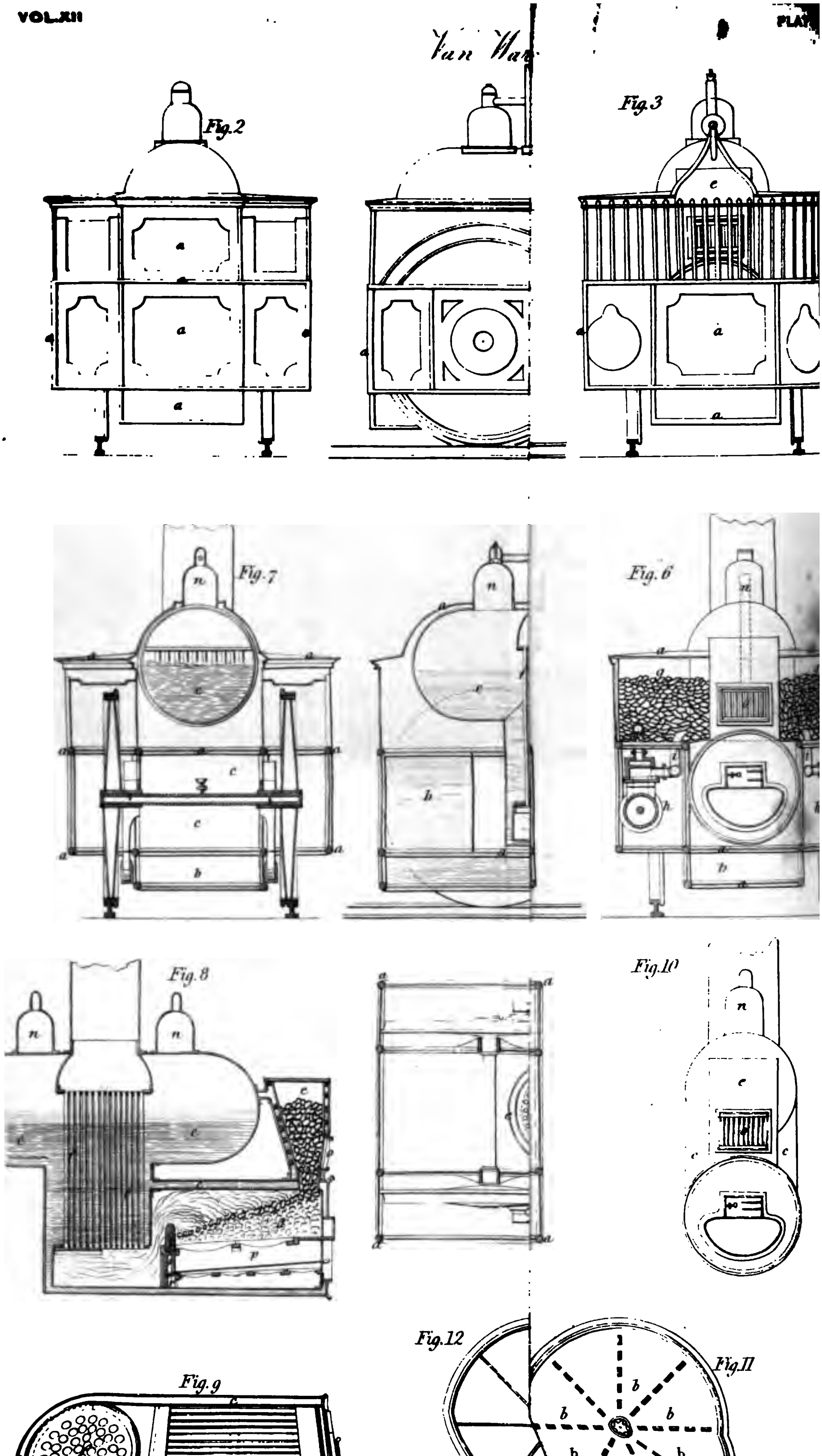


Fig.2
Fig.3
Fig.7
Fig.6
Fig.8
Fig.10
Fig.9
Fig.12
Fig.11

Van Wart & Co.'s Steam Vessel

Fig.16

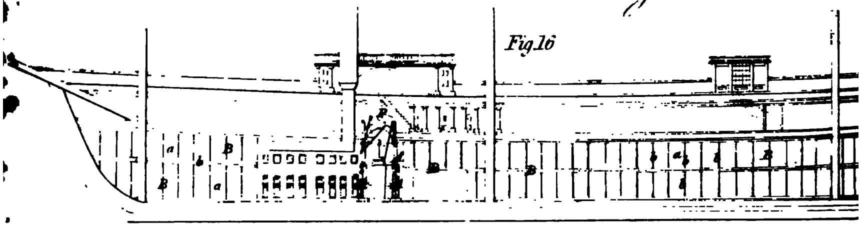


Fig.17

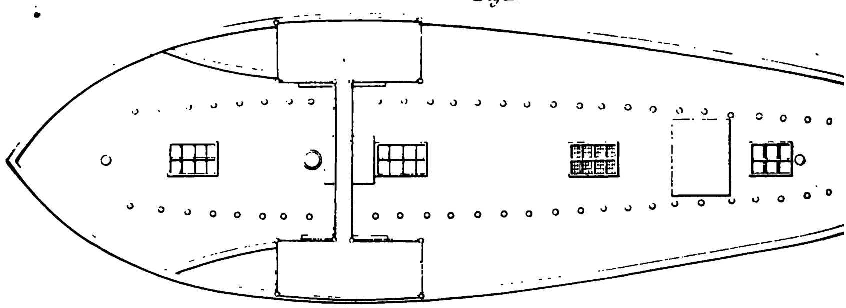


Fig.18

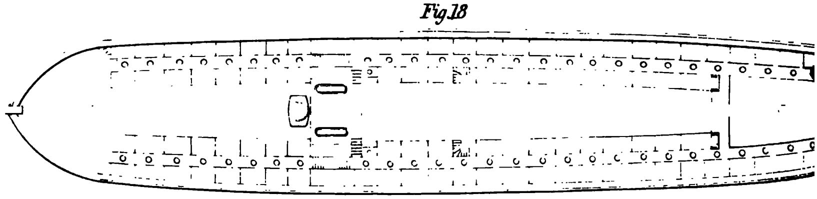


Fig.19

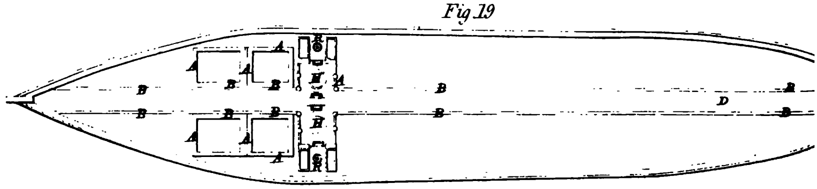
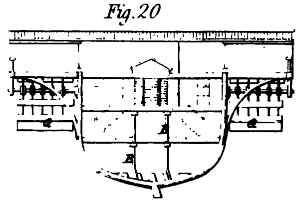


Fig.20



THE

London

JOURNAL AND REPERTORY

OF

Arts, Sciences, and Manufactures.

CONJOINED SERIES.

No. LXXVII.

Recent Patents.

To Henry Van Wart, *of Birmingham, in the county of Warwick, merchant, and* Samuel Aspinall Goddard, *of the same place, merchant, for certain improvements in locomotive steam-engines and carriages, parts of which improvements are applicable to ordinary steam-engines and other purposes; being a communication from a foreigner residing abroad.*—[Sealed 22d September, 1836.]

These improvements in locomotive steam-engines and carriages, parts of which improvements are applicable to ordinary steam-engines and other purposes, *consist in certain additions to, and improvements in, steam-engine and propelling machinery,* for which patents were granted in this country to William Church, gentleman, dated respectively the 29th November, 1830;* the 9th February,

* See vol. viii. of our Second Series, p. 1.

1832;* the 7th September, 1833;† and the 16th March, 1835;‡ *being subsequent inventions* of the said William Church, gentleman (a foreigner), communicated to us from abroad.

The subjects of the present improvements apply, first, to locomotive steam-engines and carriages; secondly, to ordinary marine steam-engines; and, thirdly, to both locomotive and stationary engines, to be employed on land or water.

Under the first head, viz. locomotive steam-engines and carriages, the improvements are in the arrangement of the parts of the carriage, for the purpose of enclosing the engines, and affording convenient space for the stowage of water and fuel; the construction of the boiler and furnace; and the construction of the running wheels.

Under the second head, viz. marine steam-engines, the improvements apply to the arrangement of the framework of the engine, in connexion with the framing of the vessel; in the arrangement of the parts of the engine itself; and in the arrangement and construction of boilers for such engines.

Under the third head, which applies to locomotive, marine, and stationary engines, the improvements are in the construction and mode of working the slide valves, the water and steam gauge, the mode of lubricating the axles and other rubbing parts, and the distillation of water for the supply of steam-boilers and other purposes, and the generation of steam by the process of condensation, for the working of secondary engines.

In the accompanying drawings (see Plate XI.), fig. 1, represents a side elevation of the locomotive steam-car-

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* See vol. ii. Conjoined Series, p. 89.

† See vol. iv. Conjoined Series, p. 233.

‡ See vol. ix. Conjoined Series, pp. 256, 313.

riage; figs. 2, and 3, end views of the same; fig. 4, a horizontal section of the carriage, showing the boiler and engines within; fig. 5, is a longitudinal elevation, in section, taken through the middle of the boiler and furnace; fig. 6, is a sectional elevation taken through the carriage transversely in front of the boiler and furnace; and fig. 7, is also a sectional elevation taken transversely through the carriage in the situation of the axis of the hinder running wheels, looking from the hinder part of the engine.

The framework and casing *a, a, a,* is of iron, constructed of plates, the edges of which are inserted into round bars; *b, b,* is the water tank; *c, c,* the boiler enclosing the furnace *d.* The coking chamber *e,* is surrounded by water, and the flues of the furnace terminate in tubes *f, f,* which lead to the chimney; *g, g,* are the fuel chambers; *h, h,* the cylinders, receiving their steam by the induction pipes *i, i,* and passing it off by the eduction passages *k, k*; *l, l,* is the working gear, connecting rods, and other parts of the engine, several of which are more particularly described hereafter; *m,* the place for the engineer or stoker.

The construction of the boiler is represented in sectional elevation, taken longitudinally at fig. 8; in horizontal section through the furnace and tubular flues at fig. 9, and in front elevation at fig. 10, the letters of reference pointing out the same parts in these figures as in the preceding. The steam chambers *n, n,* have each a safety valve as usual. A grating *o,* in front of the coking chamber *e,* allows air to pass in to assist the combustion. The ash-pit *p,* is open to the atmosphere at the front end, and in the lower part of it a second series of fire bars *q,* see fig. 5, are placed much closer to each other than the ordinary ones. Upon this second series the cinders and unconsumed fuel are received as they fall from above, and their further combustion is caused by air passing between the lower bars into the box or chamber

r, at the end of the ash-pit; the air thus becoming heated. The top of the box *r*, is furnished with a sliding door attached to a handle extending to the front of the furnace. Above this chamber *r*, there is a hollow door *s*, which shuts close, and separates the ash-pit from the flue. When this door is shut, as represented, the hollow space within it forms a passage of communication from the box or chamber *r*, to an aperture through the bridge of the furnace at *t*. By these means, heated air is conducted from the ash-pit into the hinder part of the furnace, where it assists the combustion of the fuel, and greatly promotes the consumption of the smoke: the door of the box *r*, being kept closed until a sufficient quantity of ignited cinders or unconsumed fuel has fallen from the furnace, when the door may be opened, and the hot air admitted to the bridge; or the same effect might be obtained by a series of pipes open at one end to the atmosphere, and the other to the box *r*; the air, in its passage through the tubes, becoming heated by the cinders and unconsumed fuel which has fallen through between the fire-bars; or fire-bars and tubes may be placed alternately side by side.

The running wheels of the locomotive engine, which are also applicable to other carriages, are constructed partly upon the plan of Mr. Benjamin Hicks's patent disc wheels,* but improved in the facility of construction as well as in strength and lightness. The wheels are formed entirely of iron, and they have slender spokes, made of thin bars of iron, fixed at their inner ends into the box or nave, by having the ends of the metal upset in the shape of a dovetail, which are made fast in the nave by caulking, and at their outer ends the spokes butt against the ring of iron which forms the felloe. Fig. 11, represents one of these

* See vol. vii. of our present Conjoined Series, p. 265.

wheels complete; fig. 12, the same, having its outer disc removed; fig. 13, is an edge view of the wheel; fig. 14, a diametrical section; and fig. 15, represents one of the spokes detached.

The spokes *a, a, a,* are boxed in on each side by a circular plate or disc of sheet iron *b, b*; which circular plates are confined in their situations partly by series of tenons formed on the edges of the spokes at *c, c, c*; these tenons being passed through corresponding mortices in the discs, and afterwards rivetted on the outsides.

The discs are each attached to the nave of the wheel by having their inner edges upset in the form of a dovetail, and, being heated, they are then slunk into slight grooves against dovetailed shoulders formed round the nave, and secured by rivetting over. The outer edges of the discs are also upset in the form of a dovetail, and inserted into grooves in the ring or felloe by heating the ring, and allowing it to shrink on to the edges of the discs, after which the ring is caulked or rivetted upon the dovetailed edges so as to secure the discs firmly.

The second part of these improvements applying to marine steam-engines, consist in the peculiar arrangement of the framework of the engine in connexion with the framing of the vessel; in the arrangement of the working parts of the engine itself; and also in an improved arrangement and construction of boilers for such engines. The first of these improvements are designed not only to economize space, so that the engine, with its appendages, shall occupy little room, but also that great strength and stability of construction may be attained, whereby the strain of the vessel will be more equally distributed through the whole of her structure, and not act partially, as in the common construction of vessels where the hull is framed independently of

r, at the end of the ash-pit; the air thus ... xion or union with
The top of the box r, is furnished ...
attached to a handle extending to th ... commonly built at one
Above this chamber r, there is a h ... rk of the engine at another,
close, and separates the ash-pit ... two being by such stays and
door is shut, as represented ... e engine and her boilers in their
forms a passage of commun ... reas, these improvements particu-
r, to an aperture throu ... rporation or identity of the framing
By these means, heat ... oilers with that of the hull of the vessel
into the hinder pa ... have, as it were, the same foundation,
combustion of the ... ted and connected together as one fabric.
tion of the smo ... figs. 16, to 23*, inclusive, of the accom-
until a suffici ... wings, will explain these improvements. Fig.
fuel has fa ... ngitudinal section, taken vertically through a
opened, ... cket principally intended to carry passengers; fig.
effect ... plan or horizontal view of the upper deck; fig. 18,
end ... longitudinal section, taken horizontally at her main
in ... showing the arrangement of the cabins and other
parts; fig. 19, is another similar section, taken at the line
of her lower deck; fig. 20, is a transverse section, taken
vertically abaft the engine-room.

In Plate XIV., fig. 21, is another transverse section, drawn on an enlarged scale, showing the cross-framing of the engines; fig. 22, is a partial longitudinal section of the same, taken in the line of her keel, or in the centre passage way, which extends along the vessel from head to stern, and showing a pair of boilers and one engine; fig. 23, is a plan or horizontal view of the pair of engines and their boilers; fig. 23*, is a representation of the working cylinders and air-pumps detached, the same letters of reference being marked upon corresponding parts in all these figures: A, A, is the main framework of the engine, connected at the bottom part by bolts to strong

parallel to the keelson, and at its sides to the ., B, extending the whole length of the bolted at their bottom parts to strong t the top to the beams of the main partitions B, B, are composed of plates cted to iron rods or framework *b*, *b*, as ig. 16, and from the passage way or space ʒ, which is intended to be used as a chamber stowage of coals through the whole length, or such thereof as may be desirable. It will be seen that these main partitions B, B, extend the whole length of the vessel, and are so connected to the framing of the engines and boiler, that they form one central framing, or, as it may be called, back bone of the ship. The spaces on each side of the passage are to be used for stowage, as usual: E, E, are the boilers, more particularly described hereafter, surrounded with any non-conducting material placed between them and their outer casing or framing; F, F, the steam-pipes; G, G, the slide-valve cases; H, H, are the cylinders; I, I, the piston rods; K, K, the cross-heads attached thereto, having arms J, J*, descending on each side of the cylinder into the case or parallel motion at L, L; the lower ends of the arms J, J*, are attached by joints to the fork arms M, M, of the connecting rods N, N; O, O, are the cranks; P, P, the paddle-shafts turning in proper bearings in the framing of the engine; Q, Q, the paddles; R, R, the air-pump, receiving the exit steam from the condensers S, S; and T, T, are the refrigerators for cooling the water produced by condensation, and rendering it of a proper temperature to be again employed as the condensing or jet water, as described in the specification of the patent of said William Church, dated 16th March, 1835, above alluded to.

The air-pumps are worked by the forked levers U, U, connected at the forked ends to the cross-heads K, K, of

the piston rods by the links and pins at *c*, *c*. This lever has its fulcrum in the crutch or rocking lever *d*, turning in bearings at *e*, *e*. The other ends of the levers u, u, are connected to the piston rods of the air-pumps, and have a parallel motion by means of the rocking lever *d*, and the links or bridle pieces *f*, *f*, pointed at one end to the air-pump beam, and at the other to stationary pins. The hot water pumps, for supplying the boilers, are worked from the air-pump beams, and are situated at w, w. The refrigerating water required for the condensers may be obtained from the paddle-wheels, by placing a trough or other suitable receptacle within the paddle-boxes at a proper height to receive the water thrown up by their rotation. The water so obtained, at an elevation above the water line, may be conducted by pipes to the refrigerators situated below, and the water from the condensers may be conducted therefrom, and discharged at the side of the vessel as in common.

In case there should not be sufficient water obtained by this means, a lift pump may be used, or the air-pump may be constructed in connexion with a cold water force-pump, as shown in fig. 24: *a*, is the barrel of the air-pump; *b*, its piston; *c*, the induction passage; *d*, the exit. The cold water pump is formed by the hollow piston *e*, and the hollow part of the piston rod of the air-pump *f*, *f*; the cold water enters by the passage *g*, *g*, and rising in the hollow parts, is forced, by the down-stroke of the piston, through the passage *h*, proper valves being placed in these passages.

The several figures 25, 26, and 27, will serve to explain the construction and arrangement of the boiler, with its furnace, flues, and fuel chambers, as adapted for marine purposes. Fig. 25, is a transverse vertical section; fig. 26, a longitudinal section; and fig. 27, is a horizontal section: *a*, *a*, are the various water ways or water chambers.

of the boiler; *b*, the furnace; *c*, the ash-pit; *d*, the flues terminating in tubes *e*, and passing off by the channel *f*, to the chimney; *g*, *g*, are doors, which can be opened for the purpose of clearing out and repairing the tubular flues; *i*, *i*, are the fuel chambers, which are filled as required, and from whence it is raked down into the passage *k*, where it becomes coked, the air being supplied for this purpose through the small gratings at *l*; *m*, is the door for stoking the fire, and, if thought desirable, the same contrivance for supplying heated air to the interior of the furnace, at the end of the first flue or bridge, may be used as is described in the former part of this specification as applied to locomotive engines.

The peculiar construction of slide valve, and the apparatus for working it, are shown at fig. 28, which represents an elevation, partly in section, of a portion of the carriage, with the working cylinder, the slide-valve, the piston, the force pump, the running wheels, the crank, connecting rods, the parallel motion, the slide-valve motion, and the reversing and hand gear. Fig. 29, is a horizontal view of the same: the cylinder is shown at *a*; *b*, is the piston; *c*, its rod, to which is attached the arm *d*, connected to the plunger *e*, working in the barrel of the force pump. The steam way or induction pipe *f*, communicates with the passages *g*, and *h*, in the steam box, and leading into the cylinder, the one at one side of the piston, and the other at the opposite; *i*, and *j*, are the eduction ways respectively communicating with the passages *g*, and *h*. A sliding plate *k*, *k*, intercepts the communication between the ways *f*, *i*, and *j*, and the passages *g*, and *h*. This plate operates as the slide-valve, having three apertures through it 1, 2, and 3. In the position of the slide-valve shown in the drawing, the way from *f*, is open by the aperture 2, for the admission of steam through the passage *g*, into the

cylinder, at which time the aperture 3, allows the steam from the opposite end of the cylinder to escape through the passage *h*, by the eduction way *j*; but when the slide-valve has moved forward, the aperture 2, will close the steam communication from the way *f*, through the passage *g*, and open the way from *f*, through the passage *h*, to the other end of the cylinder, the sliding valve having closed the eduction way *j*, and opened the way *i*, through the aperture 1, to the passage *g*, for the discharge of the steam from that end of the cylinder. To the end of the piston rod *c*, a connecting rod *l*, *l*, is attached by a joint, having a guide roller, the reverse end of which connecting rod is attached to a crank or crank-pin *m*, fixed in the face of the running wheel. In the side of this connecting rod there is a stud or pin, shown in section at *n*, the rod being broken away in the drawing in order to represent the mechanism behind more distinctly.

The apparatus, which I denominate a pair of semi-elliptical tumblers *p*, and *q*, vibrate upon fixed studs *r*, *r*, and have grooves formed in them, for the reception and traversing of the stud *n*, extending from the side of the connecting rod *l*, as above described. These tumblers are connected by toothed segments, so that when one turns upon its axle, the other moves through a corresponding arc in the opposite direction.

Now, as the piston *b*, traverses to and fro in the working cylinder *a*, the rods *c*, and *l*, will traverse also; and as the crank-pin *m*, revolves with the running wheel, the stud *n*, will be made to travel through an elliptical curve represented by the red dotted line. If it be supposed that the piston *b*, is moving in a direction toward the right hand end of the cylinder, the stud *n*, will be necessarily carried along the upper portion of the groove of the tumblers *p*, and *q*, and when the piston has nearly reached the end of

its stroke, the stud *n*, will have arrived in the situation shown in the figure, and be about to descend into the lower part of its elliptical curve, in doing which the stud will press upon the beak near the end of the groove, and force the tumbler *q*, into the position shown by dots; and as it passes through the extremity of the elliptical curve, it will descend into the lower groove, the other tumbler *p*, being at the same time made to assume a corresponding position, and to bring the lower grooves of both into coincidence. The stud *n*, will now, by the returning stroke of the piston and rods, pass along the lower part of the elliptical curve, moving in the lower groove of the tumblers until it arrives at the beak in the tumbler *p*, which it will rise in like manner into the position shown in the figure; and after passing that extremity of its elliptical curve, will move along the upper groove of the tumblers *p*, and *q*, as before described.

From the upper part of the tumbler *q*, a lug *s*, projects, to which a rod *t*, is attached by a joint, and this rod *t*, is in like manner connected to the lower end of a sweep lever *u*, which, by means of a pin *o*, extending from a boss at its back, turns in a socket fixed to the framework. This sweep lever *u*, is formed by two parallel plates joined together by pins, with distance pieces at top and botton, and to it one end of the rod *v*, is connected, the reverse end of that rod being attached to the slide valve *k*. The mode of connecting the slide-valve rod *v*, with the sweep lever *u*, is by means of a pin *w*, flattened at its ends for the purpose of enabling it to slide in the slots of the sweep lever. It will hence be perceived that as the tumbler *q*, rises and falls by the action of the stud *n*, as described, the rod *v*, with the slide-valve *k*, will be moved to and fro, and consequently the steam ways and eduction ways are opened and shut as above explained, for the purpose of working the piston.

In order to reverse the motion, a bell-crank lever *x*, is connected to the valve rod *v*, by a stud introduced into a long slot near the end of that rod, the fulcrum of the lever *x*, being a pin fixed in the framework. The other arm of this lever *x*, is connected, by a rod, to another lever *y*, extending from a transverse shaft, on which the handle *z*, is attached. When it is required to reverse the action of the piston, the engineer, by drawing the handle *z*, into the position shown by dotted lines raises the end of the valve rod *v*, to the upper part of the sweep lever *u*, by which means the valve *k*, is slidden so as to change the positions of the apertures for the passage of the induction and eduction steam, that is, opening the steam way from *f*, through the aperture 2, to the passage *h*, and from the passage *g*, through the aperture 1, to the eduction way *i*. It only remains to be observed that, by drawing the handle *z*, into a perpendicular position, the steam passages will all be closed. Thus, by moving the handle to and fro, the engines may be worked by hand, or what is technically called handed. It should be here remarked, that proper means must be used to tighten the steam box upon the slide-valve as it may be requisite, which may be done by turning the screws 4, 5, 6, and 7, or by any other convenient means.

(To be continued.)

To JOHN CHANTER, *of Earl-street, Blackfriars, in the city of London, and of Upper Stamford-street, in the county of Surrey, Esq., and* JOHN GRAY, *of Liverpool, in the county af Lancaster, engineer, for their invention of improvements in furnaces in locomotive engines, and other purposes.*—[Sealed 17th February, 1837.]

THE subjects of this patent appear to be a number of fanciful forms of boilers, in which the features of two former

Chanter & Gray's Impd. Boilers

Fig.1

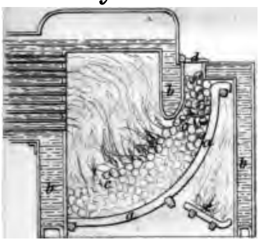


Fig.2

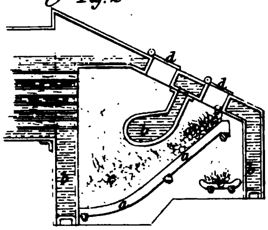


Fig.3

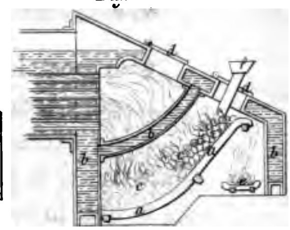


Fig.5

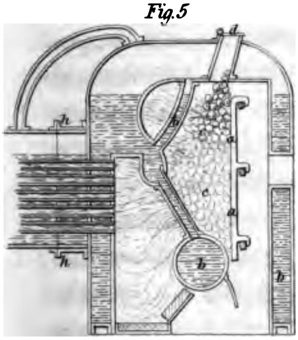
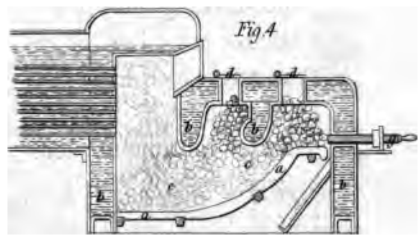


Fig.4



Losh's Improvements in decomposing muriate of Soda

Fig.6

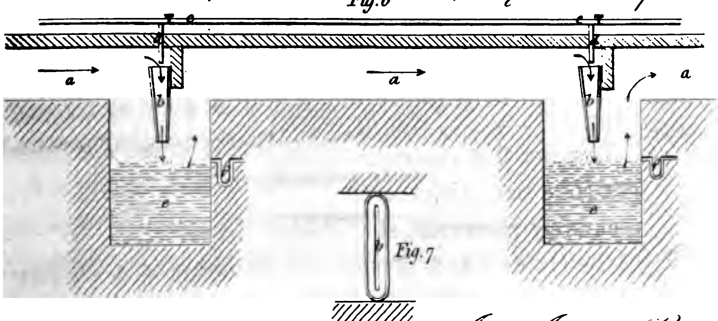
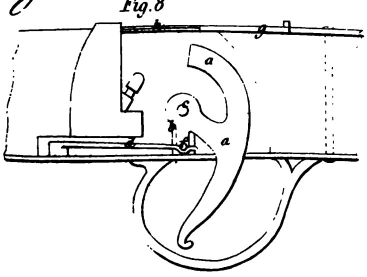


Fig.7

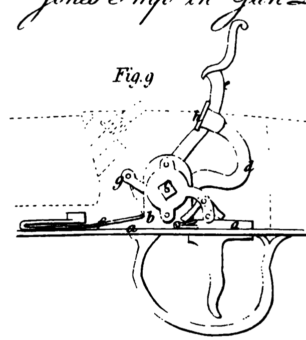
Jones' Impts. in Percussion Locks

Fig.8



Jones' Impts. in Gun Locks

Fig.9



patents are variously modified without any evident advantage.

In the year 1834, a patent was granted to the said John Chanter, gentleman, for improvements in furnaces, (dated 2d September, see vol. xi. p. 42, of our present Conjoined Series,) in which the principal feature of novelty was a mode of retaining fuel in the furnace in a situation where it might become coked before it fell down upon the fire-bars; and this was effected by placing the coal upon a ledge formed by one of the water channels of the boiler, where the coal, being baked and partially burnt, discharged its smoke and gas, and was converted into coke. Another patent was also granted to the said John Chanter, gentleman, in conjunction with the present Patentee, John Gray, for their invention of a new combination of parts forming an improved furnace for consuming smoke and economizing fuel, applicable to locomotive-carriages, steam-boats, &c., (dated 2d November, 1835; see, likewise, vol. xi. p. 214, of our present Conjoined Series,) in which an additional fire grate, that is two positions for the reception of ignited fuel, was provided within the furnace; the one being formed by a branch of the water chamber of the boiler, and the other by curved gratings.

The present invention seems to be merely modifications of the arrangement of these parts in combination, of which we shall give a few examples, not deeming it necessary to exhibit the numerous figures, which occupy several sheets of drawing.

Plate XIII., fig. 1, is a longitudinal section of one of the boilers, with its furnace within: *a, a,* are a series of curved bars forming a grate; *b,* is a portion of the boiler extending downwards; *c, c,* is the fuel, introduced at a door *d,* and which fuel slides down the fire-bars gradually as the lower portion of it burns away, the upper portion of the

fuel being confined between the water chamber b, and the top part of the grate, where it becomes coked, giving out its smoke and gas, which is consumed as it passes down through the ignited fuel below, and the heat of its combustion made available to the generating of steam; hence that very great desideratum for locomotive engines is obtained, the most intense combustion being carried on without emitting a dense smoke. The coking operation is considerably aided by an additional fire upon an extra grating *e*, below, which receives the falling cinders, and assists the draft.

Other modifications of the arrangement are shown at figs. 2, 3, 4, and 5, of which very little further description need be given, as the parts so nearly correspond with those of fig. 1. In fig. 2, the water chamber *b*, is curved, in order that the vapour and smoke may be deflected, and the fire-bars *a*, are less inclined. In fig. 3, the water chamber *b*, is formed by a series of tubes, which admit the flames to pass through. The upper part of the fire-box has two openings; one for supplying the coal, the other for coke; and a hopper *f*, is introduced into the former. Fig. 4, represents a modification, in which a series of small rammers *g*, are employed, for the purpose of occasionally pushing the fuel forward, and preventing its coking on the bars; and also two water chambers *b*, *b*, are introduced, forming separate chambers for the coal and for the coke.

Another arrangement of the parts is shown at fig. 5, in which the fire-bars *a*, *a*, are placed vertically; *b*, *b*, are the water chambers or tubes, being ramifications of the boiler; *e*, is the fuel, admitted by an opening at top; and this fire-box may be attached to the boiler by flanges and angle iron hoops, as at *h*, *h*.

It will be unnecessary to describe further the numerous modifications proposed, as they consist merely in slight

variations of form or arrangement. We shall, therefore, conclude by giving the claims, which are divided into eight heads.

The Patentees claim nothing that has been used before separately or combined; but, first, they claim the mode of combining the guard or partition *b*, with inclined bars *a*, as in fig. 1, and as in fig. 5; second, the mode of applying the fire-bars or extra grating *e*, in combination with inclined fire-bars *a*; third, applying a surface of fire-brick in combination with inclined or vertical fire-bars; fourth, combining of vertical fire-bars, when in combination with suitable surfaces *c*, for conducting the dense smoke through the fire, as in fig. 5; fifth, the application of fire-bars at a greater angle than thirty-five degrees to locomotive steam-boilers, in order to obtain a constant sliding down of the fuel, when combined with suitable surfaces *c*; sixth, the mode of constructing or combining fire-bars partly inclined and partly horizontal; seventh, the mode of combining the fire-box or furnace to locomotive engine-boilers by iron hoops, as at fig. 5; and eighth, the mode of applying small hoppers, as in fig. 3, and also rammers as in fig. 4.—[*Inrolled in the Inrolment Office, August*, 1837.]

To MATTHEW TOWGOOD, *of Dartford, in the county of Kent, paper-maker, for his invention of certain improvements in cutting paper.*—[Sealed 15th March, 1832.]

PAPER, when made in great lengths, in the Fourdrinier machine, requires to be cut up into sheets for use; and this has been usually done by rolling or winding the entire length of paper upon an open reel, and then cutting through the whole mass, that is a great many thicknesses at one angle of the reel; an operation which is attended

with great labour, and, beside, produces sheets of different lengths, owing to the paper on the outer part of the roll being extended over a greater surface than that which is nearer to the centre of the reel; thus causing additional trouble in re-cutting the sheet to one size, and a considerable waste of the paper.

Some contrivances for cutting paper into single sheets as its length proceeds from the drying apparatus of the paper-making machine have been introduced;* but the Patentee considers his present invention to be more simple than any which have preceded it.

The paper in this improved machine passes in an indefinite continuous length from the drying apparatus between rollers, which conduct it between two steel edges placed transversely, and acting like shears; and when a certain length of the paper has proceeded onward, the shears are made to act and to cut off crosswise, or in a transverse direction, a certain portion of a sheet from the continuous length; which sheet being removed, the length of paper then passes forward, and another sheet is cut off, and so on until the whole of the length of the paper has been cut transversely into sheets of any required length.

In order that these sheets of paper may be all exactly of the same size, it is necessary that a certain length of paper, accurately measured, should be advanced after each stroke of the shears; and for this purpose the paper is led forward by a pair of rollers, which are made to turn by an adjustable vibrating arm, acting upon a measuring wheel at the end of the axle of one of the conducting rollers. This arm is worked by a crank pin at the end of the

* See Crompton's invention, vol. iv. of our Second Series, p. 284; Cowper's invention, vol. viii. Second Series, p. 20; and Fourdrinier's, vol. i. Conjoined Series, p. 273.

axle of a conical roller, which is driven by a band passed round it, and round another conical roller placed in an opposite direction, so that whatever extent of rotary action is given to the measuring wheel by the adjustable vibrating arm, in the same ratio will be the lengths of the sheets of paper cut off; and as the speed must be proportioned to the rapidity with which the paper is delivered from the drying machine, that may be regulated by sliding the driving band toward the larger diameter of one of the conical rollers, and toward the smaller diameter of the other.

The Patentee adds, that as it may be necessary to separate the length of paper longitudinally as well as transversely, in order to cut up the paper into small sheets, he would for that purpose use the circular cutter, which is already well known.—[*Inrolled in the Inrolment Office, September,* 1832.]

To JOSHUA JOHN LLOYD MARGARY, *of Wellington-road, St. John's Wood, in the county of Middlesex, Esq., for his invention of a new mode of preserving certain animal and vegetable substances from decay.*—[Sealed 19th December, 1837.]

THE Patentee states, I take sulphate of copper, which salt of copper I prefer, being the cheapest, and to every pound avoirdupois I put five gallons of water, either warm or cold, but warm water dissolves it soonest. When thoroughly mixed in a wooden or other suitable cistern, I let it run upon the substance that is to be acted upon, which, if timber or wood of any kind, should be fixed in a tank made of wood, or any suitable material, and allowed to remain in the solution two days for every inch of thick-

ness, but to ensure durability, the longer time that large beams remain the better.

The timber should be submitted to the process in a perfectly dry state, in order that it may absorb as much of the solution as possible. Canvass should be immersed in the said tank in layers, the better to ensure complete saturation, and should remain in the solution till completely saturated, say for from about eight to sixteen hours, according to its thickness, then put to drain, and afterwards hung up to dry, when it will be fit for use.

Rope is twisted so hard that it would take a long time to saturate, and it is best saturated with the solution when in the state called strands, or of twine; and linen, or cotton, thread, or cloth, or woollen, or worsted yarn, I submit to the operation of the solution of the tank as aforesaid: paper may be sponged over with the solution on both sides, but it is best to mix the solution with the pulp: parchment, leather, and skins, I also place in the tank, and a very short time is sufficient for parchment to remain in the solution; when completely moist, it may be taken out and dried, and will be fit for use. Skins should remain in the solution, according to their thickness, from one to ten days.

Now, whereas, if acetate of copper be used, and acid should be employed to dissolve it, I should then mix one pound avoirdupois of acetate of copper with two quarts of pyroligneous acid and fourteen quarts of water, and then it may be used in the tank in the same manner as sulphate of copper, which dissolves in water, as before described. And, whereas, the certain substances to which I allude in the title of my said invention, are timber and wood of all kinds, canvass or other cloth, whether hempen, flaxen, cotton, or woollen, the threads also of which such cloth is wove; and rope, twine, hemp, flax, cotton, and wool, paper, parchment, leather and skins.

And, whereas, I claim as my invention, the wetting, saturating, steeping, or soaking of the said substances with or in such solutions of sulphate of copper as aforesaid, for the purpose of preserving the same from decay.—[*Inrolled in the Inrolment Office, June, 1838.*]

To HENRY WARNER, *of Loughborough, in the county of Leicester, hosier,* CHARLES WOOD, *of the same place, framesmith and setter-up, and* BENJAMIN ABBOTT, *also of the same place, framework-knitter, for their having invented certain improvements upon machinery now in use for making or manufacturing stockings, stocking-net, or framework knitting, warp web, warp net, and point net.*—[Sealed 8th March, 1832.]

THE subject of this patent is described as a mode of simplifying the construction of the ordinary warp-frame, by dispensing with the jacks and their appendages, and substituting an additional sinker bar with extra sinkers attached thereto.

The explanation of this simplification of a warp machine occupies thirteen closely-written skins of parchment, and is illustrated by seven elaborate sheets of drawing. A treatise of such magnitude it is utterly impossible for us to find room for in detail in the pages of our journal; and from its perusal, we consider it equally impracticable to attempt an epitome: our readers must, therefore, be content, in this instance, with the substance of the concluding paragraph, which seems to embrace the features of novelty.

The Patentee says, that he makes "no claim to the mode of pressing down the beards of the needles by the same means which slide the stitches along the stems of the

needles, in order to land the stitches on the beards, except when the same is performed by means of filling pieces. [Inrolled in the Inrolment Office, September, 1832.]

To William Lloyd Wharton, *of Dryburn, in the county of Durham, Esq., for his invention of certain improvements in engines for raising or forcing water by the pressure and condensation of steam.*—[Sealed 30th January, 1832.]

This is one of those crude schemes which it has been occasionally our duty to report, consisting of a complicated system of tubes and valves, supposed to be so arranged as to produce, to a certain extent, a self-acting power, somewhat on the principle of a Savory's engine.

If the development of the plan proposed by the Patentee had not been so rudely set out as to be almost unintelligible, we should have considered it unnecessary to have been very minute in our description of this invention; but as it is, the barbarous drawings accompanying the specification afford ample excuse for the imperfection and briefness of our report.

The invention is said to be designed to supersede the use of a beam and other mechanical appendages of a steam-engine, in pumping or raising water, by directing the power of the steam immediately on to the surface of the water, to be raised by the intervention only of a float instead of a piston. The elastic force of the steam produced by any of the ordinary constructions of boiler, is conveyed on to the float upon the top of a column of water, which water is by that means depressed in its vessel, and forced through certain valves below into other tubes, where it is for the moment retained.

by suitable valves. The depressing of the float through the agency of a small rod causes a tumbler to fall over, and to open a valve, which allows the air to escape and the steam to become condensed, when the float rises. The tumbler being by the rising of the float thrown back again, the steam is again admitted and allowed to depress the float, and force down the column of water as before; and thus, by successive strokes, a quantity of water is passed through certain valves, which are opened and closed at the proper period by the machinery; and the water is thus forced or raised from stage to stage, in the several tubes. Instead of packing, oil or tallow is to be employed.—[*Inrolled in the Inrolment Office, March,* 1832.]

To Alexander Beattie Shankland, *of Liverpool-street, in the city of London, gentleman, in consequence of a communication made to him by a foreigner residing in America, for a new method of cutting, working, and planing of wood, minerals, and metal, by means of machinery.*—[Sealed 23d February, 1832.]

The subject of this patent is a machine for planing flooring boards, and at the same time tongueing and grooving their edges. A board is placed upon the bed of the machine, between two pairs of rollers, the upper ones being made to press down and hold the board tightly, by means of weighted levers bearing upon the ends of their axles. These rollers are made to revolve slowly, but simultaneously, by means of a system of toothed wheels taking into each other, which are actuated by gear from the first moving rotary power, and thus the board is gradually advanced along the bed under the cutting tools.

The upper surface of the board, as it passes along, is

acted upon by a revolving adz, turned rapidly in a vertical direction by a strap from the driving axle, which adz chips the face of the board, and renders it a smooth plain surface, whilst the edges of the board are cut to the required form of tonge and groove, by two other cutters revolving in horizontal directions, also driven by bands from the main axle.

The Patentee says, that he claims the construction and arrangement of the machinery as described; but in our opinion that claim comprehends very little if any novelty, as all the features of the invention have been before embodied in the planing machinery, for which Mr. Muir has obtained patents in 1827, and 1831. See vol. ii. p. 68, of our Second Series, and vol. i. p. 49, of our present Conjoined Series; in the latter of which, the adjustable rotary adz is particularly set out as one of its novel features.— [*Inrolled in the Inrolment Office, August*, 1832.]

To THOMAS PETHERICK, *of Penpelleck, in the parish of Tydwardrestle, in the county of Cornwall, mine agent, and* JOHN FILMORE KINGSTON, *in the county of Devon, gentleman, for their invention of improvements in machinery and apparatus for separating copper, lead, and other ores, from earthy and other substances, with which they are, or may be, mixed; the said improvements being applicable to machinery, for which a patent was granted by his late Majesty, King William the Fourth, to the petition of Thomas Petherick, bearing date the 28th April*, 1830.—[Sealed 8th March, 1832.]

THE invention which constituted the subject of the former patent, above referred to, is described in the fourth vol. of our present Conjoined Series, p. 298, and Plate XIV.

The improvements now proposed, consists, firstly, in the introduction of valves in the plunger or piston of the former machinery, in order to produce the effect of a forcing pump, by which a portion of the water employed for washing the ore shall be driven off at every stroke, and prevented from returning into the washing vessel, but allowed to flow into a distinct vessel, where any of the finer particles of the ore that may be mixed with the water may be allowed to subside; and the water, after flowing over the receiving vessel, may be raised again by a pump, for the further operation of washing the ore.

Secondly, instead of the mode first described, the water may be allowed to descend from an elevated reservoir, and after washing the ore to flow off without the use of a pump.

The object is to obtain a sudden flux of the water into the washing vessel, but to prevent any reflux; and this may be done either by suitable valves in the piston, which shall prevent a return of the water when the piston rises, or by jets of water from an elevated reservoir, the water being allowed to flow away from the vessel in which the ore is washed into a receiving vessel, from whence it may be again pumped. This, therefore, is the subject of the present patent, without regard to forms, arrangements, or dimensions of the parts.—[*Inrolled in the Inrolment Office, September*, 1832.]

To JOHN HEMMING, *of Edward-street, Portman-square, in the county of Middlesex, gentleman, for his invention of improvements in the manufacture of white lead.*—[Sealed 13th October, 1836.]

THE Patentee describes his invention in the following words:—I take nitrate of soda or nitrate of potash; the

former I prefer, as being a cheaper article, and equally adapted for the purpose required; and, having separated the impurities, add to it a sufficient quantity of sulphuric acid to separate the nitric acid by distillation. The residue, which is sulphate of soda, I convert into carbonate of soda, by mixing with it a sufficient quantity of coal, lime, or chalk, and heating intensely in a reverberatory furnace.

I then take oxide of lead, prepared by heating metallic lead with free access of air, or manufactured by any other process, or the litharge or massicott formed in separating silver from lead, and dissolve it in the nitric acid distilled from the nitrate of soda or potash, as before described, the nitric acid being previously diluted with about six times its volume of water. I then add a clear solution of the carbonate of soda or potash, made with fair water, to the clear solution of lead, dissolved in the dilute nitric acid, until all the lead is precipitated, as carbonate of lead or white lead.

When the white lead has duly subsided, I draw off the supernatant liquor and wash the precipitate with fair water, which is in like manner to be drawn off when the precipitate has again subsided, and added to the former liquor. I boil or evaporate these liquors to dryness, and the result is nitrate of soda or potash. This is again heated with sulphuric acid to separate the nitric acid, and the residual salt of soda or potash is again to be converted into a carbonate by the process before described. These processes to be repeated, so that the nitrate of soda or potash employed shall be recovered, and again converted into carbonates.

I claim to use, in the mode described, pyroligneous or acetic acid, or any other acid capable of dissolving the oxide of lead, and also any other alkaline or earthy carbonate; but I prefer the nitric acid as prepared from nitrate of soda. I do not claim for any novelty in the manufacture of the

acid employed, nor for the conversion of the sulphate of soda or potash into carbonate of soda or potash, nor for the precipitation of lead from its solution by an alkaline carbonate; but I claim for the combination and application of the processes herein described to the manufacture of white lead, and to the continued recovery of the nitrate of soda or potash employed, and to the carbonate of potash or soda.—[*Inrolled in the Inrolment Office, April,* 1837.]

To JOHN WOOLRICH, *of Birmingham, in the county of Warwick, professor of chemistry in the Royal School of Medicine at Birmingham, for his invention of certain improvements in producing or making the substance commonly called or known by the name of carbonate of baryta, or carbonate of barytes.*—[Sealed 22nd June, 1836.]

THIS invention consists in producing or making the substance commonly called or known by the name of carbonate of baryta, or carbonate of barytes, by applying the gas produced by heating to a red heat in a retort a mixture of the substance commonly called sulphate of baryta, and charcoal or coke; or by applying carbonic acid gas, obtained by any process, to a solution in water of the substance commonly called or known by the name of sulphuret of barium, and thereby forming a precipitate; this precipitate, taken from the liquor, and washed, dried, and heated upon a stove, is the said carbonate of baryta, or carbonate of barytes. And in further compliance with the said proviso, I do hereby particularly describe and ascertain in what manner the said invention is to be performed by the following statement, that is to say, I take any convenient quantity of the substance commonly called or known by the name of sulphate of baryta, finely powdered, say one

hundred pounds, and mix it with about one-fifth of its weight of finely-powdered charcoal, or of finely-powdered coke, so that the mixture consists of about five-sixth parts of finely-powdered sulphate of baryta, and one-sixth part of finely-powdered charcoal, or of finely-powdered coke. It is not essential to preserve these proportions, but I find it generally the cheapest and most convenient. I then put the mixture into a retort and heat it to a red heat, and keep it of that heat for about two hours: the gas formed from the mixture during the heating process is not confined in the retort. It is not essential to keep the mixture to a red heat for about two hours, or to discontinue the heating process at the expiration of that time, but about two hours is the time I generally prefer and adopt for keeping the mixture of a red heat.

As soon as convenient, the particular time not being of importance, I remove the contents of the retort, which contents consist principally of the substance now generally known by the name of sulphate of barium, and which sulphate of barium is soluble in water; and I put such contents into a sufficient quantity of water to dissolve the said sulphuret of barium, and the contents of the retort are kept in the water until the sulphuret of barium is dissolved.

If cold water be used, about ten times its weight of cold water will dissolve the said sulphuret of barium in the course of a few hours; if hot water be used, a less quantity, and a shorter time will be sufficient: an excess of water is immaterial. When the sulphuret of barium is dissolved, I draw off the clear solution into another vessel.

Into the vessel containing the said clear solution I pass, by means of a pipe connected with and going from the retort used in heating the previously-described mixture of sulphate of baryta and charcoal or coke, the gas which is gradually formed from the said mixture during the entire

previously-mentioned heating process of a mixture formed as previously described, and of which the aggregate weight is the same, or nearly the same, as the weight of the mixture from which the solution of sulphuret of barium has been obtained.

Carbonic acid gas, obtained by any process, may be substituted for and applied in the same manner as the gas procured in the manner hereinbefore described; but I prefer the gas procured in the manner hereinbefore described, as being more economical. As the gas procured in the manner hereinbefore described, or as the carbonic acid gas, in whatever manner procured, enters the vessel containing the said clear solution, a substance is formed, and precipitates. When this precipitate has subsided, I separate it from the liquor in the usual way, and then I wash, dry, and heat the precipitate upon a hot stove for about an hour; the said precipitate so washed, dried, and heated, is the substance commonly called or known by the name of carbonate of baryta, or carbonate of barytes.

Now, whereas, I do not claim the making or producing, or the mode of making or producing, the substance hereinbefore mentioned, and now generally known by the name of sulphuret of barium, or the producing or making, or the mode of producing or making, the solution of sulphuret of barium in water; but I do claim, as my invention, the following improvements, that is to say, the producing or making the substance commonly called or known by the name of carbonate of baryta, or carbonate of barytes, by applying to a solution of sulphuret of barium in water the gas produced in the manner hereinbefore described; or by applying to such solution carbonic acid gas, obtained by any process.—[*Inrolled in the Inrolment Office, December, 1836.*]

To WILLIAM LOSH, *of Benton Hall, in the county of Northumberland, Esq., for his invention of improvements in decomposing muriate of soda (common salt), parts of which improvements are also applicable to the condensing vapours of other processes.*—[Sealed 23d December, 1837.]

THE Patentee commences his specification by describing certain methods, at present well known and in use, for condensing the deleterious vapours arising from various processes and manufacture; and he states that his reason for so doing is, that he may more clearly point out the difference between his improvements and those processes at present in use.

The peculiar method of condensing muriatic acid gas, which the Patentee has described as well known, is by forcing small jets of water into the flue containing the vapour, and thereby condensing it, and also creating a draft; he has, therefore, considered it right to bring it forward, as, upon first sight, his new invention and this old method may be thought to be very similar, when, upon careful consideration, they will be found to be essentially different.

It will readily be understood that only a portion, and, perhaps, only a small portion, of the deleterious vapour can be taken up or condensed by the old method of forcing jets of water into the flue, as a great portion of the vapour will necessarily pass along the flue without being disturbed by these jets.

The peculiar apparatus, which the Patentee has described, and which, he considers, will more effectually condense the vapours, is shown at Plate XIII., fig. 6, which represents a longitudinal section of part of the flue coming from the apparatus in which muriate of soda is under decomposition: *a, a, a,* is the flue, the arrows representing

the direction which the vapours pass in their passage along the flue; *b*, *b*, are a sort of wide-shaped funnel, shown detached in plan at fig. 7, having a long narrow opening at bottom. One, two, or more of these may be placed side by side: *c*, *c*, is a supply pipe, along which water is forced with very great velocity: this pipe has small jet pipes *d*, *d*, through which the water escapes with very great velocity; and, passing through the funnels *b*, *b*, impinges with very considerable force on the surface of the water in the wells *e*, *e*, which are furnished with bent overflow pipes *f*, *f*, the height of the water always being kept the same by this means.

It will now be seen, that as the water is forced down the funnel it will create a partial vacuum, thereby causing a draft of the vapours through the funnel, and an intermixture with the water, and partial condensation will take place; and, if any of the vapours should escape this first process it may be subjected to a second, as in the figure, or even to a third, if thought necessary; but it will be generally found that two are sufficient, for if any vapour should escape after passing through the second funnel, it will be in such a small quantity as to have no deleterious effect upon the surrounding atmosphere.—[*Inrolled in the Inrolment Office, June,* 1838.]

To Thomas Hodgson Leighton, *of Blythe, in the county of Northumberland, chemist, for his invention of certain improvements in converting sulphate of soda into the subcarbonate of soda, or mineral alkali.*—[Sealed 12th April, 1836.]

The object of the Patentee is to conduct the operation of producing mineral alkali from sulphate of soda, without

allowing the sulphur to escape into the atmosphere during the process; by which means he prevents those offensive effluvias being thrown off, which have been found so extremely prejudicial in neighbourhoods where such chemical operations have been carried on.

The Patentee sets out the ordinary process in which the sulphate of soda, with lime and coal, is operated upon by fire in a reverberatory furnace; the soda taking up carbon, and the sulphuric acid passing off into the atmosphere.

In the new process herein proposed, a common reverberatory furnace is employed, having a metal pan or box of extent equal to the length and width of the working bed, and in depth about one foot, which is to be built into the bottom. A steam pipe from a boiler furnished with a stop-cock is inserted into the box near the bottom, which pipe should pass over the fire to prevent the steam condensing; and a waste pipe is also let into the lower part of the box to discharge condensed water.

The box is to be filled with bricks, to form the hearth or working bed of the furnace, which the Patentee proposes to arrange in the following way:—A course of common bricks are to be placed edgewise, leaving a space of about an inch between each; over these another course is to be laid flat and close together, and upon these a course of fire bricks are to be set edgewise close together, which will complete the furnace-bottom.

The dimensions of the furnace is unimportant, the Patentee uses one having a bed of four feet square; the steam-pipe is of one and a half inch bore, and the steam applied at a pressure of sixteen pounds on the inch.

The furnace being heated, and the steam shut off, three-quarters of a hundred weight of small coal is thrown in with half a hundred weight of fresh burnt lime, or a hundred weight of chalk. These matters are to be brought into a

state of ignition, and, on the steam being admitted into the box from below, about a hundred weight of sulphate of soda, in a powdered state, is to be introduced gradually, stirring the whole together in order that the materials may be well mixed. This stirring operation is to be continued until all the sulphate of soda is decomposed, which may be known by occasionally testing a small quantity of the material. The materials in the furnace being prevented from melting or running into flux by the steam and the continued stirring.

When the decomposing part of the process is complete, the whole of the materials are to be removed from the furnace, and placed in a metal vessel having a pipe at the bottom covered with a common filter, and the top of the vessel is to be closed by a thin sheet of metal perforated with small holes; warm water is then to be passed through the perforated cover in a shower on to the material within as long, the Patentee says, "as any alkali or subcarbonate of soda comes off from it, which is to be ascertained either by taste, or by trying the specific gravity of the solution with a hydrometer.

"The material may be considered as sufficiently exhausted, if the hydrometer does not exhibit more than two degrees above the ordinary specific gravity of the water used for dissolving. The residuum in the vessel must then be drained and allowed to heat, which it will do, and it being in a proper state, will easily be known by the material smoking and feeling hot.

"Sulphate of lime is thus formed, which is to be dissolved by stopping the pipe at the bottom of the vessel, and running on boiling water; and after about an hour, this water may be drawn off, and a fresh supply introduced, and repeated until all the sulphate of lime is washed out of the vessel; which solution of sulphate of lime may

be collected in any convenient vessel, when as much muriatic acid is to be added as will precipitate all the sulphur.

"The solution of subcarbonate of soda, or mineral alkali, first drawn off, is to be collected into another vessel and examined; and if found to contain caustic alkali (which is shown by its not effervescing when a small portion of acid is dropped into it) or sulphur (which may be shown by sugar of lead, or any other ordinary test), carbonic acid is to be forced into it, by passing steam through a metal cylinder charged with charcoal and heated red hot, having a pipe connected with it, and the end immersed in the alkaline solution; the same may be effected by adding muriatic or other strong acid to chalk in a close vessel with a pipe leading into the alkaline solution, which is now found to be sufficiently pure to make crystals of soda, soap, or for any other purpose for which the mineral alkali is used."

The Patentee says, in conclusion, that he does not confine himself to the precise means of constructing the furnace described, in order to apply the steam, by its passing between the brick, as variation may be made in its construction to effect the same object; but that he claims, first, the application of steam into and with the material in the furnace in the converting of sulphate of soda into subcarbonate of soda, or mineral alkali, as described; and, secondly, the process of running streams of hot water through the materials from the furnace, collecting the solution of subcarbonate of soda, permitting the materials to heat, and again applying streams of hot water, and then drawing off the solution of sulphate of lime, whereby I am enabled to obtain the sulphur in place of its going into the atmosphere.—[*Inrolled in the Inrolment Office, October*, 1836.]

To Charles Jones, *of Birmingham, in the county of Warwick, gun-maker, for his invention of certain improvements upon percussion locks, applicable to fire-arms.*—[Sealed 7th March, 1833.]

The Patentee describes his invention under four heads; first, a mode of combining the parts of a gun-lock answering to the tumbler, the cock or hammer, and the trigger, in one piece; second, a mode of bringing the action of the main spring against a part corresponding to the tumbler, so as to form a detent, in order to hold the parts when the piece is cocked, and to operate as a force to accelerate its discharge; third, in placing the whole of the lock within the stock, in order that it may be effectually protected from damp; and, fourth, in double-barrel guns attaching both cocks to one plate.

This improved construction of gun-lock is shown in Plate XIII., at fig. 8, which represents the side of the stock removed in order to show the new parts within: *a, a, a,* is the piece forming in one the cock, tumbler, and trigger. This piece *a,* is mounted upon a stud *b,* fastened to the lock plate, and turns upon a pin or pivot at *c.* The main spring *d,* has a dent or recess *e,* near its end, which an anti-friction roller in the tumbler *f,* passes into, when the piece is brought to cock, as in this figure. This dent or recess, as a detent, holds the tumbler and cock firmly, until, by forcing back the trigger, the anti-friction roller is drawn out of the recess, and the power of the spring sets the piece off, and causes the end of the cock to strike the detonating cap on the end of the nipple, and thereby fire the charge within the barrel.

In order to protect the lock and the priming from damp, a slider *g,* is made to close the opening *h,* through which

the priming is introduced, and when that is closed, the whole of the lock is concealed.

The fourth head is simply the attachment of two sets of the parts, as described, one to each side of a central perpendicular plate, of which no representation need be given, as it will be obvious that the forms must be the same, but repeated for a double-barrel gun.—[*Inrolled in the Inrolment Office, September*, 1833.]

To Charles Jones, *of Birmingham, in the county of Warwick, gun-maker, for his new arrangement of additions to and alterations in certain parts of gun and pistol locks.*—[Sealed 12th June, 1833.]

These improvements in gun locks are described as consisting, first, in attaching the main spring, tumbler, sear, and bridle to a certain block fixed on the trigger-plate; forming the hammer in one piece with the tumbler; and causing the trigger and sear to act on one and the same centre, and with one common spring: second, affixing a bell-formed cup at the end of the hammer, and furnishing it with a vent: third, having no hammer on the cock, no separate trigger-spring, and making the central rise on the trigger-plate serve for the lock-plate.

These peculiarities of construction are shown in a detached view of a gun lock in Plate XIII., fig. 9: *a, a*, is the block fixed to the trigger-plate, having a central ridge *b*, in which the axle *c*, is mounted, carrying the hammer *d*, with the tumbler and cock *e*, which are all acted upon at the same time by the main spring *f*, through the bridle *g*.

At the end of the hammer, which is separate from the cock, the bell-formed cup *h*, is attached, which, when the

piece goes off, strikes upon the detonating priming and explodes it. This is shown by dots in the figure.

The nipple *i*, is enclosed in a small chamber behind the breech part of the barrel, through a central hole in which the end of the nipple protrudes: but when the bell cup *h*, of the hammer falls upon the nipple, as shown by dots, the aperture of the small chamber becomes closed by the mouth of the bell cup, and the smoke emitted from explosion is prevented from passing into the works of the lock, but escapes from the small chamber into the atmosphere, through a lateral opening provided as a vent.

The sear and trigger are both mounted upon one small axle at *k*, in the central block of the trigger plate, and hence that block is made to operate instead of a lock-plate.—[*Inrolled in the Inrolment Office, December*, 1833.]

To Benjamin Cook, *of Birmingham, brass-founder, for his invention of an improvement in gas-burners, commonly called or known by the name of Argand burners.*—[Sealed 9th December, 1837.]

The Patentee states, that all Argand burners hitherto used for the consumption of gas, have had the apertures through which the gas passes at the top of such burners drilled in vertical directions, in order that the flame might ascend perpendicularly; he, however, conceives that there would be an advantage in drilling the holes for the escape of the gas in the sides of the burners, or at least at considerable angles from the perpendicular.

The advantages proposed are, that the flames issuing from the holes by these means would pass through a larger space, and be thereby enabled to consume a greater portion of the oxygen of the atmosphere, and, necessarily

taste, which reflect great credit upon his exertions, and appear suited to the important nature of the grants; and if accompanied with good impressions of the Great Seal, would carry that character of "*official importance*," which they ought to possess. But at present we have a deed highly embellished and beautifully written on vellum, with an unsightly lump of wax, bearing no intelligible device, nor any perceptible meaning. We trust his lordship, the Chancellor, will take this into his immediate consideration.

The new Great Seal of England of our amiable young Queen is now in use, and we have within these few days received several Letters Patent, with the impressions appended thereto; but however beautiful the seal may be, either in design or execution, no one can judge of its merits, for the "*wax*" is really worse than ever, and looks more like bird-lime and rosin; it is sticky to the touch, and so soft, that it could not retain the impression for one hour. The seals invariably stick to the tin boxes in which they are enclosed, and cannot be removed, so that the Patentees must content themselves with viewing only the outer tin case, or, at most, one side of the wax, with an obliterated impression; for if the seal was to be removed from the box it would be in broken pieces, or present a blank face, the counterpart impression of the surface of the tin.

For the information of our readers, we subjoin a short description of the seal which has been executed by Mr. Benjamin Wyon, chief engraver of her Majesty's Mint and Seals, in his usual style of excellence.

Her Majesty's New Great Seal is a most beautiful specimen of art, and reflects the highest credit on the talent, skill, and professional taste of the artist:—Obverse: An equestrian figure of her Majesty, attended by a page. The Queen is supposed to be riding in state; over a riding-habit she is attired in a large robe, or cloak, and the collar of the order of the Garter; in her right hand she carries a sceptre, and on her head is placed a royal tiara or diadem. The attendant page, with his hat in his hand, looks up to the Queen, whilst gently restraining the impatient

courser, which is richly decorated with plumes and trappings. The inscription, "Victoria, Dei Gratia Britanniarum Regina, Fidei Defensor," is engraved in Gothic letters, and the spaces between the words are filled with heraldic roses.—Reverse: The Queen, royally robed and crowned, holding in her right hand the sceptre, and in her left the orb, is seated upon the throne, beneath a rich Gothic canopy; on either side is a figure of Justice and Religion; and in the exergue are the royal arms and crown; the whole encircled by a wreath or border of oak and roses.

NEWTON AND BERRY,
Office for Patents, 66, Chancery-lane.

SCIENTIFIC ADJUDICATION.

LOSH *v.* HAGUE.

COURT OF EXCHEQUER, GUILDHALL, LONDON, BEFORE THE CHIEF BARON, LORD ABINGER, 4TH JULY, 1838.

THIS was an issue directed by the Court of Chancery, to try the validity of a patent granted in August, 1830, to the plaintiff, William Losh, Esq., for "improvements in the construction of wheels for carriages to be used on railways" (see vol. vi. of our present Conjoined Series, p. 107).

The plaintiff's wheels were made of iron, the outer ends of the spokes being bent over with an elbow, and curved so as to form the felloe or rim when combined, and the inner ends of the spokes made with dovetails and cast into a metal box or nave.

Wheels of this construction were made by the defendant in despite of the plaintiff's patent, and the application to the Court of Chancery was for an injunction to restrain the defendant from making any more such wheels.

The resemblance, though not perfectly identical, between the plaintiff's and defendant's wheels could not be positively denied, but the defence set up was, the invention was old, that one Thomas Paton obtained in September, 1808, a patent for "an

improved wheel for various useful purposes," the construction of which was asserted to be on precisely the same plan or principle as that claimed by the plaintiff. On the production, however, of Paton's specification, the description appeared to be so very uncouth and defective, and the drawings so badly executed, that the Court could not satisfactorily determine whether the principles of Paton's and Losh's wheels were identical or not. An injunction was, therefore, granted, to restrain the defendants from making such wheels until the second day of Michaelmas term; before which time the plaintiff was to bring his action, in order that a jury might examine and determine whether the invention of the plaintiff was new, and, consequently, whether the defendant had infringed a valid patent right.

Sir F. Pollock, Mr. Bayley, and Mr. Rotch, were for the plaintiff; the Attorney-General, Mr. Sergeant Bompas, and Mr. Petersdorff, for the defendant.

Sir F. Pollock described the invention laid claim to by the plaintiff as one in general request by the proprietors of railways, in consequence of its strength and durability. These qualities were obtained by forming the spokes and their corresponding felloes of one piece of wrought iron, continuing the spokes into the felloes by means of elbow ends, and giving to the elbow ends a curved prolongation, whereby the several felloes might be soldered into a solid inner rim. By these means the whole wheel was rendered better able to endure the wear and tear arising from the great speed at which railway carriages were now propelled, and also to withstand the casual concussions to which they were subjected. The defendant had infringed on the patent of the plaintiff by constructing wheels which were of a different fashion, but dependent on the same principle. The alteration made by him was a trifling one, and, if any thing, rather detracted from the properties possessed by the invention of the plaintiff. The best criterion of the truth in cases of this nature was the history of the invention itself.

If it were found that at the date of the invention an improvement had been required, and if subsequently that which the

plaintiff had supplied had been acknowledged to be an improvement, and had been generally used, then it was fair to infer that his article had the merit of an invention. He anticipated that an attempt would be made to invalidate the patent of the plaintiff, by declaring his invention to be identical with one for which a patent had been taken out in 1808, by a person of the name of Paton. He defied his learned friends to prove that. Of Paton's wheels a dozen pairs at the most had been sold, while the plaintiff's were in general request. Paton's were for carriages in general, and not for railways; they were dished, which the plaintiff's were not; and, being made of pieces, would fall asunder if the tire were to fall off, which would not be the case in the event of a similar accident befalling those of Mr. Losh. Mr. Losh had taken out a patent in 1816, which was much nearer to Paton's invention. As this issue was to be tried by order of the Court of Chancery, the jury would content themselves with giving a verdict for the plaintiff or the defendant, as in their judgment they should deem right, with nominal damages only.

The learned counsel then called a great number of scientific witnesses, the most eminent among whom were Mr. Bramah, of London, and Mr. Wood, of the Darlington and Stockton Railway. The testimony of all of them went to show, that at the present rate of speed the old wheels would be unsafe; that those of Mr. Losh were more durable and stronger; that they would not fall to pieces even if the tire should fall off; and that they owed these qualities to the principle of forming the spokes, and the felloes corresponding to them, into one piece of wrought iron.

The cross-examination went to show that the moulding of the spokes and felloes into one solid piece would suggest itself to every good workman who might use wrought iron; that the wrought iron was necessary only on account of the speed now required, and that the essential principle was the union of the spokes and rim into one block independently of the tire.

The Attorney-General contended that the invention to which Mr. Losh laid claim had been known and long practised, because an obvious contrivance by all persons desirous of having a wheel

of wrought iron. It had not, it was true, been in use before the year 1830, because a speed that would have rendered the use of cast-iron dangerous had not until then been ventured on. When that speed became desirable on the Liverpool and Manchester Railway, Mr. Stephenson, the partner of Mr. Losh, and the engineer of the railway, introduced a wrought-iron wheel. Mr. Losh then took out a patent for it: a patent not for a new invention, but for the material with which an old one was to be constructed.

Now, in the choice of materials, an invention that would support a patent could not consist; as it could not consist in a preference of firwood to oak, or beech to ash, it could not consist in the preference of wrought-iron to cast. It was necessary to the validity of a patent, that the whole of the specification should be supported. Mr. Losh, in his specification, disclaimed the exclusive use of wrought-iron spokes or tire, or the mode of uniting the spokes with the nave. From this, then, it would follow that the novelty was confined to the felloes, and consisted in their prolonged elbow ends. If, then, that were not new, the patent would be gone. The plaintiff claimed such a wheel, even though it should have no tire. If, then, it could be shown that such a construction was known before the year 1830, with or without a tire, the defendant would be entitled to a verdict. That it had not been applied to railways was of no consequence, as before 1830 the rate of velocity had not rendered a wheel of such construction necessary.

It would be seen that the principle of that construction was indicated in the specification of Paton's patent of 1808, which expired in 1822. Indeed, the description in the two patents was nearly the same. (Here the learned gentleman read the specification of Paton's patent, and produced a model of the sectors of his wheel.) Another model, which he would produce, would show that what had been described as essential to Losh's patent, wrought-iron spokes and rim in one piece, namely, had been made in 1808; and also that the wheels were not dished. The patent of 1816 was also the same in principle as this (here the

learned gentleman read a passage from the specification of Losh and Stephenson's patent of 1816), and indeed, an invasion of Paton's patent. There was, therefore, no pretence for saying that this was an invention that would support a patent; for the question was, not whether Mr. Losh had known it or not, but whether it was publicly known before he took out his patent. He would proceed, then, to prove the specifications, and, by the evidence of some distinguished men, to establish what he had laid down.

The learned gentleman then proceeded to call a great number of witnesses, the most eminent of whom were Mr. Braithwaite, and Mr. Roberts, of the firm of Sharp, Roberts, and Co., of Manchester. Their testimony went to show that Paton's wheel and Losh's were identical; that any workman might make Losh's wheels from Paton's specification; and that the latter clearly announced the principle of uniting into one piece the spokes and the rim, and of using wrought iron.

Nothing material was elicited in cross-examination, except that some servants of Paton proved his invention to have been one that had not succeeded.

Sir F. Pollock replied.

Lord Abinger summed up, and the Jury, at half-past seven, returned a verdict for the defendant.

This verdict, on being produced in the Court of Chancery will, of course, dissolve the injunction, and adjudge the plaintiff to pay costs in both courts.

SOCIETY FOR THE ENCOURAGEMENT OF ARTS, MANUFACTURES, AND COMMERCE.

LONDON, 1838.

THE REWARDS ADJUDGED BY THE SOCIETY DURING THE PRESENT SESSION.

IN MECHANICS.

To Messrs. G. and W. Bursill, Queen's Head-lane, Islington, for their safe lamp for miners, the silver medal.

To J. F. Goddard, Chatham, for his apparatus for experiments on polarizing light, the silver medal.

— Mr. J. P. Paine, High-street, Bloomsbury, for his escapement-wheel for turret clocks, the silver medal.

— Mr. A. P. Walsh, Great George-street, Euston-square, for his remontoire escapement, the silver Isis medal.

— Mr. Henry Mapple, Upper Rosomon-street, Clerkenwell, for his resonant spring for a chamber clock, 5*l*.

— Mr. J. Crockford, Litchfield-street, Soho, for his ball-valve for water-pipes, the silver Isis medal.

— Captain J. Ericsson, Adelaide-place, London-Bridge, for his hydrostatic weighing machine, the silver medal.

— Mr. Frederick Danchell, Gerrard-street, Soho, for his turning key for a piano-forte, the silver medal.

— Mr. W. Baddeley, Wellington-street, Blackfriars-road, for his portable dam for use at fires, the silver medal.

— Mr. J. Burkitt, Bartholomew-place, West Smithfield, for his self-supplying tympan to a printing-press, the silver Isis medal.

— Mr. W. Levic, Great Ormond-street, for his furnace for type-founders, 5*l*.

— Mr. C. Jenkins, Harvey's-buildings, Strand, for his adjustable step-ladder, the silver Isis medal.

— Mr. A. George Edge, R.N., for his instrument for ascertaining the stability of a ship, the silver medal.

— Mr. J. Farley, Hart's-lane, Bethnal-green-road, for his improvement in the broad-silk-loom, the silver medal and 5*l*.

— Mr. Lewis Thompson, at Messrs. Hawes', soap-manufacturers, Lambeth, for his method of preparing Prussian blue, the gold Isis medal.

— The same, for his method of purifying copper, the gold medal.

— Mr. Wildman Whitehouse, Francis-terrace, Kentish-town, for his method of making casts from morbid anatomical preparations, the silver medal.

— Mr. T. Carrick, Newcastle-on-Tyne, for his marble tablets to paint miniatures on, the silver Isis medal.

To Mr. J. Esquilant, St. Alban-street, Kennington-road, for ornaments in leather for mouldings, &c., 10*l.*

THE THANKS OF THE SOCIETY HAVE BEEN VOTED TO

Mr. A. Alexander, High-street, Exeter, for his ventilating eye-shade.

Mr. J. P. Paine, High-street, Bloomsbury, for his micrometer adjustment for the escapement of turret-clocks.

Mr. W. Kennish, carpenter on board H.M.S. Victory, for his paper on the comparative effects of black and white paint, as applied to shipping.

Colonel Le Couteur, of the Island of Jersey, for his paper on hoeing wheat.

SCIENTIFIC NOTICES.

REPORT OF TRANSACTIONS OF THE INSTITUTION OF CIVIL ENGINEERS.

(Continued from p. 244.)

A letter was read from Mr. Wicksteed, in reply to some queries which had been addressed to him respecting the weight and quality of the coals used in the Cornish engines, and the effect of the jacket.

According to some experiments of Captain Lean, it appears that the average weight of coals used at the Cornish mines is 93lbs. per bushel. The coals generally used are imported from South Wales; from Swansea, Neath, and Llanelly, and are of the *second* quality, the large being selected for the steam boats. Of the various sorts imported into Cornwall, some are light and dead burning, and run through the bars like sand; some contain slate rubbish; some coke well, and give out much heat. The weights of these different kinds of coals vary from 80lbs. to 112lbs. The coals as taken from the wharf contain about one-eighth of their weight of water. The coals are sometimes damped to make them coke, but the drier they are the better. Some of Price's

coal, from Swansea, is very bituminous, and is mixed in equal proportions with the Quaker's coal, from Neath, some of which is not bituminous. From the practice of different engineers it appears, that when the coals are light and small, there is a greater loss from their falling through the bars and being carried into the flues, before ignition, than accrues from the process of damping.

Mr. Wicksteed details some experiments made at Oldford on the weight of the Bradley Main Newcastle coal. It appears that the weight of the bushel, or of 1·63 cubic feet, is $92\frac{1}{2}$lbs.; of these $15\frac{1}{2}$lbs. were large, the smallest of which would not pass a gauge $1\frac{1}{3}$ of an inch square; $28\frac{3}{4}$lbs. would not pass a gauge $\frac{3}{8}$ths of an inch, and $48\frac{1}{4}$lbs. were small coal and dust.

Mr. Wicksteed had taken an account of duty done during three days by an engine, sixty-inch cylinder, *with* steam in the jacket, and *without* steam in the jacket; and it appears that the duty in the former case was, to that in the latter, as 100 to 90; or the jacketing effects a saving of ten per cent. The quantity of water condensed in the jacket, during 216 strokes, amounted to two per cent. of the water evaporated for working the engine.

A discussion then took place on several parts of Mr. Wicksteed's paper, read at the preceding meeting. With respect to the duty as estimated by the water delivered at the surface, or by the number of strokes, Mr. Wicksteed contended, that though the work done or real effect amounted only to 103 millions, the duty performed was really 118 millions, for the water displaced and lifted each stroke must be equal to the area of the plunger multiplied into the length of the stroke. The engine will have once received the water, whatever loss may be due to the imperfection of the pit-work.

It has been urged that the Cornish system of pumping could not be applied in water-works, where the water is to be forced directly into the main, or where the work has the irregularity consequent on the variation of pressure in the mains, and that

the action of the high-pressure steam might in the first instance burst the pipes. But if the load and its velocity are proportioned to the power of the engine, it cannot matter whether the load is distributed in long shaft rods or in any other form; that the supposition of the work being regular and steady in mines is erroneous; the variation is great, though not so great as in water-works. The Cornish engine now erecting at Oldford, has a steam cylinder of eighty inches diameter, and ten feet four inches stroke, and it is proposed to work it at about eight strokes per minute. The diameter of the plunger pole pump is forty-one inches, and stroke nine feet four inches; the pump rod will be made with moveable weights, its greatest load being 74,000lbs. Mr. Wicksteed described several arrangements which would be made for the purpose of regulating the load and working of the engine. There is a great advantage in being able to work an engine from half a stroke to twelve strokes per minute, since the coals consumed are nearly in proportion. The best velocity, however, appears to be from five to nine strokes per minute.

The friction of the Holmbush engine, according to a calculation in Mr. Wicksteed's paper, is 7¾lbs. per square inch; the friction, as ascertained in an experiment at Oldford, amounted to 5¾lbs. per square inch. The additional allowance of 2lbs. per square inch, for the friction in a Cornish engine, does not appear too much when the circumstances under which the engine works are considered.

The President inquired as to the cause of the difference of duty in the stamping engine, and in the single acting pumping engine. It was stated in reply, that the friction is much greater in double than in single engines; that the same difference existed in the Boulton and Watt low-pressure engines as in the high-pressure expansive engines.

Various opinions were entertained as to the allowance of coals per horse power per hour. According to Mr. Farey, the allowance is 10½ lbs. per horse power per hour for a double Boulton

and Watt engine. Watt's own allowance was 8lbs., and in one case of a new engine using high-pressure steam expansively, 5lbs. had been found sufficient. The superiority of the Cornish engines was to be attributed to working high steam expansively, and to the improved method of generating steam, and complete system of clothing which was adopted. The economy of fuel was pushed to a great extent in Cornwall, the fire-places are very large, and the combustion very slow, and the refuse worthless. They have no tall chimneys, and the dampers are kept very low. Attention to the management of the fires is of the greatest importance, and, as a general rule, the damper should be kept as low as possible, a high temperature should be maintained, and the less frequent the stoking the better.

February 13, 1838.

The President in the Chair.

The minutes of the discussion on Mr. Wicksteed's paper and the Cornish engines having been read, Mr. Parkes called the attention of the institution to the importance of the question of the applicability or inapplicability of the Cornish system of using steam in condensing engines generally. It seemed to him, after the confirmation which the statements regarding the Cornish engines had lately received from the praiseworthy exertions of Mr. Wicksteed, that, as regards economy of fuel, the Cornish engine was even still more superior to the low-pressure engine, than the latter was (at the period of its invention by Mr. Watt) to the original atmospheric one; that there existed, indeed (if all we heard were true), less economical difference between Mr. Watt's and the high-pressure or non-condensing engine, than between the Cornish and the common Boulton and Watt engine. If such were the case, which could now scarcely admit of a doubt, Mr. Parkes thought that the interests of science and the arts demanded a much more thorough and searching investigation into the rationale of the Cornish engine than had yet been made; and he thought it a reproach to the institution, that no one of its members is yet prepared to say, whence arises the superiority of the Cornish engine, nor what is the relative value of the various

perfections which had been for so many years assigned to it by its employers.

Mr. Parkes thought that most engineers were agreed that the low-pressure crank-engine used for manufacturing purposes, required, in its highest state of condition, at least 10 lbs. of good coal per horse per hour; that such was Mr. Watt's own estimate, allowing 1 lb. of coal for the evaporation of 7 lbs. of water. He had had many opportunities of proving—so far as the indicator can be relied upon—the load and consumption of Boulton and Watt's own engines, as well as engines by other makers; but only in three instances had he found the consumption so small as 10 lbs. He had only, in one instance been concerned in ascertaining the duty done by a pumping engine—which was one of the same kind—not working expansively; and as this experiment was conducted with the most rigorous exactitude, the correctness of the results might be relied upon. The engine was nominally one of 40 horses' power, constructed by Messrs. Hick and Rothwell, of Bolton, erected at St. Ouen, near Paris, and employed to raise water, by means of a scope wheel, to supply a new dock. The experiments of two consecutive days were managed and checked by M. Arago, M. Jouy, Mr. H. Farey, and Mr. Parkes. By the indicator, the engine proved to be working exactly to 40 horses' power, with a consumption of 11 lbs. of good Mons coal per horse per hour: but as the actual weight of water raised, one foot high per minute, divided by 40 horses, attained 36,000 lbs., the real consumption was about 10 lbs. of coal per horse per hour. Mr. Parkes adduced this experiment with an engine of the most perfect construction and in perfect condition, as evidence, that the duty of the common low-pressure crank-engine, not working expansively, does not exceed 20 or 21 millions of lbs. raised one foot high by 90 or 94 lbs. of coal; and thus that the Cornish engine investigated by Mr. Wicksteed, exceeds such engine in economy of fuel, in the ratio of 5 to 1.*

* In the Minutes, instead of Tincroft engine, it should have been Holmbush engine. The Tincroft double engine consumed 3.25 lbs. of coals per hour per horse power; whereas a double engine, according to Mr. Farey,

Mr. Parkes then entered at some length into a consideration of the various phenomena to be observed, and facts to be ascertained, in order to determine the separate value of the parts of the system adopted in Cornwall. The assertion that the boiler was superior to others, would be confirmed or disproved by measuring the water evaporated by the fuel used, which might also be done with such accuracy, as to furnish us with the very important knowledge of the quantity of water in the shape of steam required for each stroke of the piston. A thermometric steam gauge should be fixed on the boiler, and another as near as possible to the cylinder, to determine both the pressure within the boiler, and at what pressure the steam really enters the cylinder. He suggested also that another such thermometer, fixed on the cylinder cover, might be useful, in conjunction with the indicator, to determine the increments of expansion, as well as the highest and lowest degree of pressure within the cylinder. That it appeared to him, the Cornish engineers had carried out to perfecion Mr. Watt's axiom, that "the cylinder should be maintained as hot, and the condenser as cold, as possible;" and that since the hot jacket probably played a still more important part to the cylinder of an expansive than to a non-expansive engine, no means should be left untried to ascertain the value of that element. That the thermometric steam gauge might also be a useful adjunct to the barometer, in determining the amount of vacuum in the condenser, and other phenomena connected therewith. The proportions of the air-pump and condenser to the cylinder, adopted by

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consumes 10½ lbs. The following table exhibits the comparative value of different engines in lbs. of coal per horse power per hour:—

Cornish pumping engine	1.57
Boulton and Watt single engine	4.82
Cornish double engine	3.25
Boulton and Watt double engine	10.5

Hence the superiority of the Cornish pumping engine above the Boulton and Watt single engine, is very nearly as 3.1; and the Cornish double engine above the Boulton and Watt double engine in the same proportion; and of the Cornish pumping engine above the common condensing, for manufacturing purposes, at 6½ to 1.

the Cornish engineer, should also be noted, as well as the temperature of the injected and ejected water.

Mr. Parkes then exhibited a sketch of the thermometer employed by him in many experiments on the engines working the steam plough, and stated his confidence in the accuracy of these instruments as constructed by Mr. Adie, of Liverpool, and which were now much used on the locomotive engines.

Mr. Brunel exhibited a model illustrative of his method of constructing an arch of large span without any centering.

Mr. Newton exhibited the heating apparatus invented by Joyce. The fuel was stated to be charcoal, so prepared that the carbonic acid gas given out during combustion is absorbed. The rate of combustion, and consequently the temperature, is regulated by a valve at the top.

NOTICE OF SCIENTIFIC WORKS.

A Complete Treatise on Practical Land Surveying; or, the Whole Art of Land Surveying, Plotting, Embellishing of Maps, Railway Surveying, Artificers' Work, Conic Sections, Gauging, Plane Trigonometry, Levelling and Measuring of Solids and Superfices. The whole designed for the use of Schools and Young Surveyors. By Thos. Holliday, Land Surveyor, York. 8vo. pp. 320, with many plates and wood-cuts. Whittaker and Co., and Simpkin and Marshall, London; and Bellerby, York.

This treatise on land surveying appears to be arranged in a manner that promises more general usefulness than any treatise on that subject hitherto published: although the substance of the work may be extracted from other books previously sent into the world, yet there are many minute particulars, especially in the notes, that, if attended to, cannot fail of being useful to those who are not already proficient in the practical parts of the art.

There are, besides, many useful matters connected with mathematical science incorporated into this work, which are not usually required in ordinary land surveying; but since the modern introduction of railroads in many parts of the kingdom, an extensive knowledge of the mensuration of solids, and a variety of other scientific subjects, have become absolutely necessary, in order to render the land surveyor a practical engineer also: these are included, and we have no hesitation in saying, that the work will be found to be highly instructive and interesting to students in the surveying and engineering departments of science.

List of Patents

Granted by the French Government from the 1st of July to the 30th of September, 1837.

(Concluded from page 186.)

To Auguste Chammas, of Paris, for an improved alimentary substance.

— Georges Nicolas Bengé, of Paris, for an improved lever.

— Tardy, Father, and Co., of Valence, for improvements in the stretching of silk and other fibrous substances.

— Scheibel and Loos, of Thann, for improvements in the spinning of cotton.

— Michel Désiré Pradier, of Paris, for an improved writing desk.

— Antoine Louis Sulpice Griset, of Paris, for a method of preventing accidents in the tempering of large pieces of metal.

— Prosper Favarger, of Paris, for an improved method of writing.

— Dalloz and Guillaume, of St. Claude, for a nail machine.

— Calla and David, of Paris, for a machine for purifying corn.

— Laurent Boisson, of Pont sur l'Ognon, for a machine for cutting wood.

— Pierre Charles Berthelot, of Paris, for a new kind of fuel.

— Jean Baptiste Joseph Gamand, of Amiens, for a loom for making velvet.

— Adolphe Jean, of Paris, for a new lining for hats.

To Victorine Klug, of Paris, for a new method of manufacturing matches.

— Pierre Alexis Giraudeau, of Paris, for a new kind of lozenge.

— Antoine François Waldeck, of Paris, for a new machine for cutting the worm of screws.

— Widdowson, Bussel, and Bailey, of Douay, for an improved frame for making spotted net.

— Pierre Adolphe Poisson, of Paris, for improvements in clocks.

— Pierre Hyacinthe Accolas, of Paris, for a new vehicle for the carriage of heavy goods.

— Jean Louis Flamet Junior, of Paris, for metallic button-holes.

— François Bontems, of Chatel, for a new calefyer.

— Evans, Renaux, and Breitmayer, of Lyons, for flat-bottom steam-boats.

— Louis Arnaud Tranquille Lefebvre, of Rouen, for an improved loom.

— Devaux Brothers, of Bolbec, for improvements in looms.

— Henri Désiré Poizot, of Serancourt, for improvements in the manufacturing of beet-root sugar.

— Philibert Eugéne Labouriau, of Paris, for an improved reflector.

— Jacques Lavigne, of Paris, for an odorous and inflammable paper.

— Pierret and Lamihousset, of Paris, for a new method of cutting gentlemen's shirts.

— Seillière, Heywood, and Co., of La Broque, for improvements in looms.

— Charles Testu, of Paris, for a new method of shoeing horses.

— Jalade, Lafond, and Lambert, of Paris, for new applications of caoutchouc.

— Louis Lockert, of Paris, for improvements in looms.

— Louis Jean François Guérard, of Paris, for a machine for tilting snow and ice into rivers.

— Léopold Muller Junior, of Thann, for an improved throstle.

— Cavalier Brothers, of Nimes, for an apparatus for stifling the chrysalis contained in the cocoon.

— Allier and Dupont, of Paris, for improvements in the manufacturing of hats.

— Joseph Fauste Denis, of Domèvre-sur-Durbians, for improvements in the making of wine.

— Antoine Aulaguier, of Paris, for a new cosmetic for giving gloss to the nails.

— Théodore de Mazug, of Paris, for an improved umbrella.

— Aubenas and Co., of Paris, for a syrup extracted from rice.

— Robert François Auguste Mailfer, of Joinville, for a mechanical kind of stays.

— Jean Charles Gustave Paulin, of Paris, for a means of stopping a horse which is running away.

— Jean Raillé, of Bordeaux, for a machine for the carriage of every kind of fluid.

— Nompère de Champagny, of Paris, for improved stirrups.

— Pierre François Isidore Charamont, of Paris, for improvements in opera glasses.

— Pierre Louis Jules Vasseur, of Paris, for an anti-mephitic apparatus.

— Antoine Dubois, of Monthureux sur Soane, for an improved nail machine.

— Louis Auguste Tranchant, of Dole, for an improved store.

— Louis Joseph Lepetit, of Havre, for the manufacturing of hydraulic lime.

— Alliot, of Nantes, for a new kind of steam-boat.

— Jean Pierre Bancel, of St. Chaumont, for an improved kind of fabric.

— Gilbert Perreul, of Paris, for a reaping machine.

List of Patents

Granted in Scotland between 22d June and 22d July, 1838.

To Joshua Taylor Beale, 11, Church-lane, Whitechapel, London, for certain improvements in and additions to his former inven-

tion, known by the title of a lamp applicable to the burning of substances not hitherto usually burned in such vessels or apparatus.—26th June.

To Edward Cobbold, of Long Melford, Suffolk, for certain improvements in the manufacture of gas for affording light and heat, and in the application of certain products thereof to useful purposes.—27th June.

— Stephen Geary, of Hamilton-place, New-road, London, architect, for improvements in the preparation of fuel.—27th June.

— William Gossage, of Stoke Prior, Worcestershire, manufacturing chemist, for certain improvements in the manufacturing sulphuric acid.—29th June.

— Frances Thorpe, of Knaresborough, flax-spinner, for certain improvements in machinery or apparatus for heckling, preparing, or dressing hemp, flax, and other such like fibrous materials.—29th June.

— Peter Fairbairn, of Leeds, machine-maker, for certain improvements in the machinery or apparatus for roving, spinning, doubling, and twisting cotton, flax, wool, silk, or other fibrous substances.—6th July.

— Henry Davies, of Stoke Prior, Worcestershire, for certain improved apparatus or machinery for obtaining mechanical power; also for raising or impelling fluids, and for ascertaining the measure of fluids.—11th July.

— Edward Davy, of Fordlon, near Crediton, Devonshire, for certain improvements in saddles and harness.—11th July.

— Frederick Joseph Burnell, of St. Mary at Hull, ship-insurance agent, and Hippolyte François Marquis de Bouffel Meatauban, colonel of cavalry, now residing in Sloane-street, Chelsea, in consequence of a communication made by a foreigner residing abroad, for certain improvements in the manufacture of soap.—11th July.

— William Rattray, of Aberdeen, manufacturing chemist, for certain improvements in the manufacture of the preparations called gelatine size and glue.—12th July.

— Henry Count de Crony, of the province of Picardy, France,

now residing at 14, Cambridge-street, Edgeware-road, for a new and improved method of filtration, communicated partly by a foreigner, and partly invented by himself.—13th July.

To Francis Pope, of Wolverhampton, Staffordshire, fancy iron-worker, for certain improvements for making or manufacturing pins, bolts, nails, and rivets, applicable to various useful purposes.—13th July.

— Rennel Woodcroft, of Mumps, Oldham, for improvements in the construction of looms for weaving various sorts of cloths, which looms may be set in motion by any adequate power.—19th July.

— Charles Bourjot, of Coleman-street, London, merchant, in consequence of a communication made to him by a foreigner residing abroad, for improvements in the manufacture of iron.—19th July.

— Jean Leandre Clement, of Rochford, France, now of Gurney's Hotel, Leicester-square, London, for improvements in apparatus for ascertaining and indicating the rate of vessels passing through the water.—19th July.

— Thomas Nicholas Ruper, of Greek-street, Soho, London, for improvements in rendering fabrics and leather waterproof.—19th July.

— Luke Hebert, of High-street, Camden-town, London, agent in consequence of a communication made to him by a foreigner residing abroad, for a new improved method or methods of uniting and soldering metallic substances.—19th July.

New Patents

SEALED IN ENGLAND.

1838.

To Nathan Defries, of Paddington-street, in the county of Middlesex, engineer, for his invention of improvements in gas-meters.—Sealed 27th June—6 months for inrolment.

To John Perry, of Leicester, in the county of Leicester, woolcomb-maker, for his invention of certain improvements in combs for combing wool.—Sealed 27th June—6 months for inrolment.

To Charles Green, of Birmingham, in the county of Warwick, gold-plater, for his invention of improvements in the manufacture of brass and copper tubing.—Sealed 27th June—6 months for inrolment.

To Daniel Beckham, of Sussex-place, Old Kent-road, in the county of Surrey, stereotype-founder, for his invention of an improved mode of obtaining castings in gold, silver, and albata.—Sealed 27th June—6 months for inrolment.

To Richard Badnall, of Cotton Hall, in the county of Stafford, gentleman, for his invention of a certain improvement in the manufacture of carpets and other similar woven fabrics; which improvement is effected by the introduction of a certain article of commerce not hitherto so employed or used in such manufacture.—Sealed 27th June—6 months for inrolment.

To George Round, of Birmingham, in the county of Warwick, lock-filer, and Samuel Whitford, of the same place, die-sinker, for their invention of a new and improved method of manufacturing certain of the parts of gun and pistol locks.—Sealed 30th June—6 months for inrolment.

To Henry Grey Dyar, of Cavendish-square, gentleman, and John Hemming, of Edward-street, Cavendish-square, gentleman, both in the county of Middlesex, for their invention of improvements in the manufacture of carbonate of soda.—Sealed 30th June—6 months for inrolment.

To Augustus William Johnson, of Upper Stamford-street, in the parish of St. Mary, Lambeth, in the county of Surrey, for certain improvements for preventing the incrustation of steam-boilers, or generators, or evaporating vessels.—Sealed 30th June—6 months for inrolment.

To Matthew Uzielli, of Fenchurch-street, in the city of London, merchant, for improvements in locks or fastenings; being a communication from a foreigner residing abroad.—Sealed 30th June—6 months for inrolment.

To William Dobbs, of the Penn-road, Wolverhampton, in the county of Stafford, brass-founder, for his invention of certain improvements in the construction of racks and pulleys for window blinds, and other useful purposes.—Sealed 30th June—6 months for inrolment.

To George Carter, of Lombard-street, in the city of London, gentleman, for his invention of improvements in saw-mills.—Sealed 2d July—6 months for inrolment.

To Joseph Needham Tayler, of Red Lion-square, in the parish of St. George, Bloomsbury, in the county of Middlesex, a captain in her Majesty's Royal Navy, for his invention of a certain method or certain methods of abating or lessening the mischiefs arising from the shock or force of the waves of the ocean, lakes, or rivers, and of reducing them to the comparatively harmless state known by the term broken water, and thereby preventing the injury done to, and increasing the durability of breakwaters, moleheads, piers, fortifications, light-houses, docks, wharfs, landing-places, embankments, bridges, or ponton-bridges; and also of adding to the security and defence of harbours, roadsteads, anchorages, and other places exposed to the violent action of the waves.—Sealed 4th July—6 months for inrolment.

To Edward Davy, of Fleet-street, in the city of London, chemist, for his invention of improvements in apparatus for making telegraphic communications or signals by means of electric currents, parts of such apparatus being applicable to obtaining, regulating, or measuring electric currents for other purposes.—Sealed 4th July—6 months for inrolment.

To Frederick Joseph Burnett, of St. Mary at Hill, in the

city of London, ship-insurance agent, and Hippolyte François Marquis de Bouffet Montauban, colonel of cavalry, now residing in Sloane-street, Chelsea, in the county of Middlesex, for certain improvements in the manufacture of soap.—Sealed 4th July—6 months for inrolment.

To Henry Elkington, of Northfield, in the county of Worcester, gentleman, for his invention of improvements in engines to be worked by steam-air or other fluids.—Sealed 6th July—6 months for inrolment.

To Cornelius Alfred Jaquin, of Huggin-lane, Wood-street, in the city of London, for his invention of improvements in the manufacture of buttons.—Sealed 7th July—6 months for inrolment.

To William Knight, of the city of Chichester, in the county of Sussex, ironmonger, for his invention of improvements in machinery for raising and forcing water and other fluids.—Sealed 7th July—6 months for inrolment.

To George Salter, of West Bromwich, in the county of Stafford, manufacturer, for his invention of improvements in apparatus for weighing.—Sealed 9th July—6 months for inrolment.

To Claude Schroth, of Leicester-square, in the county of Middlesex, gentleman, for an improved method or methods of making or manufacturing the tools or apparatus employed in the process of pressing or embossing the surface of leather or other substances, being a communication from a foreigner residing abroad.—Sealed 9th July—6 months for inrolment.

To William Palmer, of Sutton-street, Clerkenwell, in the county of Middlesex, manufacturer, for his invention of improvements in lamps.—Sealed 10th July—6 months for inrolment.

To William Barnett, of Brighton, in the county of Sussex, iron-founder, for his invention of certain improvements

in the manufacture of iron.—Sealed 10th July—6 months for inrolment.

To John Thomas Betts, of Smithfield-bars, in the city of London, rectifier, for improvements in the process of preparing spirituous liquors in the making of brandy.—Sealed 10th July—6 months for inrolment.

To Louis Cyprien Callet, late of New York, in the United States of America, but now residing in Manchester, in the county of Lancaster, merchant, for certain improvements in machinery or apparatus for producing motive power, applicable to propelling boats and other vessels, carriages, machines, and other useful purposes, being a communication from a foreigner residing abroad.—Sealed 11th July—6 months for inrolment.

To Henry Van Wart, of Birmingham, in the county of Warwick, merchant, and Samuel Aspinwall Goddard, of the same place, merchant, for certain improvements in machinery or apparatus applicable to locomotion on railroads and to steam navigation, parts of which improvements are also applicable to land or stationary engines, being a communication from a foreigner then residing abroad.—Sealed 11th July—6 months for inrolment.

To John Bethell, of Mecklenburgh-square, in the parish of St. Pancras and county of Middlesex, gentleman, for his improvements in rendering wood, cork, leather, woven and felted fabrics, ropes and cordage, stone and plasters or compositions, either more durable, less pervious to water, or less inflammable, as may be required for various useful purposes.—Sealed 11th July—6 months for inrolment.

To Job Cutler, of Ladypool-lane, Sparkbrook, in the parish of Aston, in the borough of Birmingham, in the county of Warwick, gentleman, and Thomas Gregory Hancock, mechanist, of Princes-street, in the borough of Birmingham, aforesaid, for their invention of an improved method of condensing the steam in steam-engines, and sup-

plying their boilers with water thereby formed.—Sealed 12th July—6 months for inrolment.

To Joseph Bennett, of Tumley, near Glossop, in the county of Derby, cotton-spinner, for his invention of certain improvements in machinery for carding wool, cotton, flax, or other fibrous substances, which are or may be carded: part of which improvements are also applicable to machinery for drawing, doubling, and roving, and spinning such fibrous substances as are or may be subjected to those operations.—Sealed 12th July—6 months for inrolment.

To James Milne, of Edinburgh, gas-meter-manufacturer, for his invention of improvements in apparatus employed in transmitting gas for the purposes of light and heat.—Sealed 13th July—6 months for inrolment.

To Alexander Cochrane, of Arundel-street, Strand, in the county of Middlesex, gentleman, for his invention of improvements in umbrellas and parasols.—Sealed 13th July—6 months for inrolment.

To Thomas Robert Sewell, of Carrington, in the county of Nottingham, lace-manufacturer, for his invention of improvements in manufacturing white lead.—Sealed 14th July—6 months for inrolment.

To Richard March Hoe, late of New York, in the United States of America, but now residing at 66, Chancery-lane, in the county of Middlesex, civil engineer, for a new or improved instrument or apparatus for ascertaining or determining the latitude and longitude of any place, or the situation of ships or other vessels at sea, and the dip and variation of the magnetic needle, which new or improved instrument he intends to denominate Sherwood's Magnetic Geometer, being a communication from a foreigner residing abroad.—Sealed 18th July—6 months for inrolment.

To Henry Ross, of Leicester, worsted-manufacturer, for his invention of improvements in machinery for combing

and drawing wool and certain descriptions of hair.—Sealed 18th July—6 months for inrolment.

To Henry Bridge Cowell, of Lower-street, Islington, in the county of Middlesex, ironmonger, for his invention of an improved apparatus answering the purpose of a press for retaining and keeping leaves, or pieces of paper, or of cloth, or of other thin substances, folded or unfolded, in a flattened condition under gentle pressure.—Sealed 18th July—6 months for inrolment.

To John Robertson, of Great Charlotte-street, Buckingham-gate, in the county of Middlesex, gentleman, for his invention of improvements of architecture in its forms and combinations, and also in the superficial figures which may be employed, also for an improvement or improvements in the surfaces of buildings.—Sealed 18th July—6 months for inrolment.

To Richard Treffry, of Manchester, in the county of Lancaster, chemist, for his invention of certain improvements in the method of preserving certain animal and vegetable substances from decay, and also in the apparatus for and mode of impregnating substances to be preserved. —Sealed 23rd July—6 months for inrolment.

To George Richards Elkington, and Oglethorpe Wakelin Barratt, of Birmingham, in the county of Warwick, manufacturers, for their invention of improvements in coating and colouring certain metals.—Sealed 24th July—6 months for inrolment.

To Joseph Price, of the parish of Gateshead, in the county of Durham, flint glass-manufacturer, for his invention of certain improvements in constructing and adapting boilers for marine stationary and locomotive engines, and in adapting and applying boilers to steam vessels.—Sealed 26th July—6 months for inrolment.

To Charles Wye Williams, of Liverpool, in the county palatine of Lancaster, gentleman, for his invention of cer-

tain improvements in the means of preparing the vegetable material of peat moss or bog, so as to render it applicable to several useful purposes, and particularly for fuel.—Sealed 26th July—6 months for inrolment.

To John Gray, of Liverpool, in the county of Lancaster, engineer, for his invention of certain improvements in steam-engines and apparatus connected therewith, which improvements are particularly applicable to marine engines for propelling boats or vessels, and part or parts of which improvements are also applicable to locomotive or stationary steam-engines, and other purposes.—Sealed 26th July—6 months for inrolment.

To William Madeley, of Manchester, in the county of Lancaster, machinist, for his invention of certain additions to and improvements in machinery used for spinning, and forming into cops, upon spindles, cotton and other fibrous materials of the like nature.—Sealed 26th July—6 months for inrolment.

To Sir William Burnett, Knight Commander of the Royal Hanoverian Guelphic Order of Somerset-house, in the county of Middlesex, for his invention of improvements in preserving wood and other vegetable matters from decay.—Sealed 26th July—6 months for inrolment.

To Alexander Croll, of Greenwich, in the county of Kent, manufacturing chemist, for his invention of improvements in the manufacture of gas for the purpose of affording light.—Sealed 26th July—6 months for inrolment.

To Frederick Edouard Fraissinet, of Covent Garden-square, in the city of Westminster, for certain improvements in the machinery for propelling vessels by steam, by which their speed will be much accelerated, with a diminished power, and with a diminished action in the water, being a communication from a foreigner residing abroad.—Sealed 26th July—6 months for inrolment.

CELESTIAL PHENOMENA, FOR AUGUST, 1838.

D.	H.	M.	
1			Clock before the sun, 6m. 1s.
—			☽ rises 4h. 5m. A.
—			☽ passes mer. 8h. 13m. A.
—			☽ sets 11h. 33m. A.
5			Clock before the sun, 5m. 43s.
—			☽ rises 8h. 6m. A.
—			☽ passes mer. morn.
—			☽ sets 3h. 1m. M.
	10	26	Ecliptic oppo. or ○ full moon.
7	3		☽ in Perigee.
	7	33	♅ in conj. with the ☽ diff. of dec. 1. 25. N.
	23	27	Ceres in conj. with the ☉
9	15	55	☿ in the descending node
10			Clock before the sun, 4m. 58s.
—			☽ rises 9h. 36m. A.
—			☽ passes mer. 4h. 33m. M.
—			☽ sets 0h. 6m. A.
12	1	28	☽ in □ or last quarter.
15	8	27	♄ in □ with the ☉
			Clock before the sun, 4m. 16s.
—			☽ rises 11h. 57m. A.
—			☽ passes mer. 8h. 10m. M.
—			☽ sets 5h. 21m. A.
16	0	27	♂ in conj. with the moon, diff. of dec. 4. 31. S.
	21	27	♀ in conj. with the moon, diff. of dec. 5. 13. S.
17			Mer. R A. 11h. 23m. dec. 2. 40. N.
—			Venus R. A. 7h. 41m. dec. 21. 12. N.
—			Mars R. A. 6h. 54m. dec. 23. 30. N.
—			Vesta R. A. 5h. 44m. dec. 19. 43. N.
—			Juno R. A. 17h. 14m. dec. 7. 39. S.
—			Pallas R. A. 8h. 41m. dec. 0. 24. S.

D.	H.	M.	
17	—		Ceres R. A. 9h. 36m. dec. 21. 3. N.
	—		Jupiter R. A. 11h. 31m. dec. 4. 23. N.
	—		Saturn R. A. 15h. 23m. dec. 16. 28. S.
	—		Georg. R. A. 22h. 52m. dec. 8. 6. S.
	—		Mercury passes mer. 1h. 42m.
	—		Venus passes mer. 22h. 0m.
	—		Mars passes mer. 21h. 12m.
	—		Jupiter passes mer. 1h. 48m.
	—		Saturn passes mer. 5h. 40m.
19	2	56	☿ in conj. with ♃ diff. of dec. 2. 49. S.
	19	18	☿ in Aphelion.
20			Clock before the sun, 3m. 13s.
	—		☽ rises 4h. 49m. M.
	—		☽ passes mer. 0h. 21m. A.
	—		☽ sets 7h. 35m. A.
	4	26	Ecliptic conj. or ● new moon.
21	12	53	♀ in the ascending node.
	20	36	♃ in conj. with the ☽ diff. of dec. 0. 1. N.
22	1	36	☿ in conj. with the ☽ diff. of dec. 3. 5. S.
	14		☽ in Apogee.
	22	57	☿ greatest elong. 27. 17. E.
25			Clock before the sun, 1m. 58s.
	—		☽ rises 10h. 42m. M.
	—		☽ passes mer. 3h. 40m. A.
	—		☽ sets 8h. 26m. A.
27	1	33	♄ in conj. with the ☽ diff. of dec. 6. 11. N.
28	8	55	☽ in □ or first quarter.
30			Clock before the sun.
	—		☽ rises 4h. 26m. A.
	—		☽ passes mer. 7h. 56m. A.
	—		☽ sets 11h. 7m. A.

The Eclipses of the Satellites of Jupiter are not visible from the 27th day of August until the 6th day of October, Jupiter being too near to the sun.

J. LEWTHWAITE, Rotherhithe.

CELESTIAL PHENOMENA, FOR AUGUST, 1838.

D.	H.	M.	
1			Clock before the sun, 6m. 1s.
	—		☽ rises 4h. 5m. A.
	—		☽ passes mer. 8h. 13m. A.
	—		☽ sets 11h. 33m. A.
5			Clock before the sun, 5m. 43s.
	—		☽ rises 8h. 6m. A.
	—		☽ passes mer. morn.
	—		☽ sets 3h. 1m. M.
	10	26	Ecliptic oppo. or ○ full moon.
7	3		☽ in Perigee.
	7	33	♅ in conj. with the ☽ diff. of dec. 1. 25. N.
	23	27	Ceres in conj. with the ☉
9	15	55	☿ in the descending node
10			Clock before the sun, 4m. 58s.
	—		☽ rises 9h. 36m. A.
	—		☽ passes mer. 4h. 33m. M.
	—		☽ sets 0h. 6m. A.
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15	8	27	♄ in □ with the ☉
			Clock before the sun, 4m. 16s.
	—		☽ rises 11h. 57m. A.
	—		☽ passes mer. 8h. 10m. M.
	—		☽ sets 5h. 21m. A.
16	0	27	♂ in conj. with the moon, diff. of dec. 4. 31. S.
	21	27	♀ in conj. with the moon, diff. of dec. 5. 13. S.
17			Mer. R. A. 11h. 23m. dec. 2. 40. N.
	—		Venus R. A. 7h. 41m. dec. 21. 12. N.
	—		Mars R. A. 6h. 54m. dec. 23. 30. N.
	—		Vesta R. A. 5h. 44m. dec. 19. 43. N.
	—		Juno R. A. 17h. 14m. dec. 7. 39. S.
	—		Pallas R. A. 8h. 41m. dec. 0. 24. S.
17	—		Ceres R. A. 9h. 36m. dec. 21. 3. N.
	—		Jupiter R. A. 11h. 31m. dec. 4. 23. N.
	—		Saturn R. A. 15h. 23m. dec. 16. 28. S.
	—		Georg. R. A. 22h. 52m. dec. 8. 6. S.
	—		Mercury passes mer. 1h. 42m.
	—		Venus passes mer. 22h. 0m.
	—		Mars passes mer. 21h. 12m.
	—		Jupiter passes mer. 1h. 48m.
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25			Clock before the sun, 1m. 58s.
	—		☽ rises 10h. 42m. M.
	—		☽ passes mer. 3h. 40m. A.
	—		☽ sets 8h. 26m. A.
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	—		☽ sets 11h. 7m. A.

The Eclipses of the Satellites of Jupiter are not visible from the 27th day of August until the 6th day of October, Jupiter being too near to the sun.

J. LEWTHWAITE, Rotherhithe.

Van Wart & Goddard's Impt. in Steam En

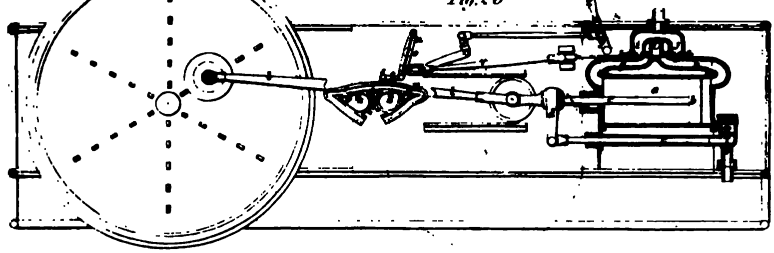


Fig. 28

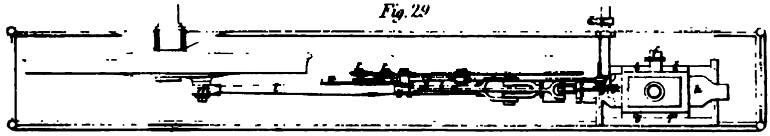


Fig. 29

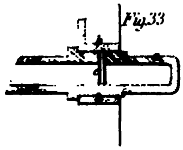


Fig. 33

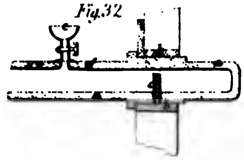


Fig. 32

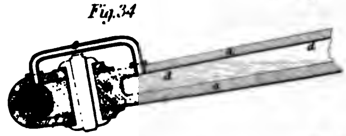


Fig. 34

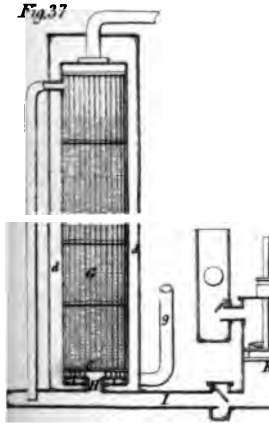
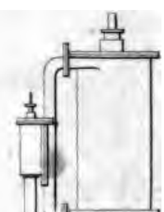


Fig. 37



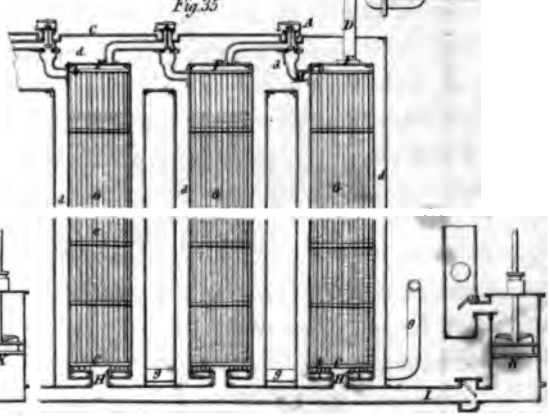


Fig. 35

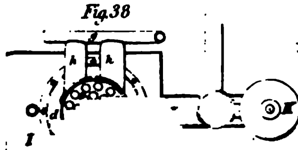


Fig. 38

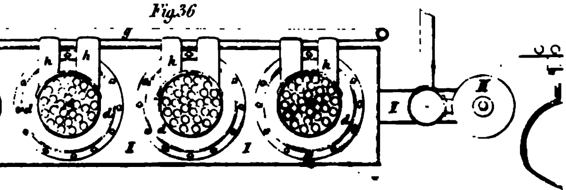


Fig. 36

THE

London

JOURNAL AND REPERTORY

OF

Arts, Sciences, and Manufactures.

CONJOINED SERIES.

No. LXXVIII.

Recent Patents.

To Henry Van Wart, *of Birmingham, in the county of Warwick, merchant, and* Samuel Aspinall Goddard, *of the same place, merchant, for certain improvements in locomotive steam engines and carriages, parts of which improvements are applicable to ordinary steam engines and other purposes; being a communication from a foreigner residing abroad.*—[Sealed 22d September, 1836.]

(Concluded from p. 268.)

The improved construction of water gauge is shown at fig. 30, Plate XV.; it applies to that description of gauges in which the height of the water in the boiler is indicated or seen by means of a glass tube; and its principal object is to avoid the liability of the said glass tube breaking by the variation of temperature, and also to prevent its furring by the sediment of the water. The improvement consists in a novel arrangement and construction of the parts of the gauge,

by means of which the water contained in it will, at all times, remain cool, or at a comparatively cool temperature, and, on any accidental fracture of the glass tube, the escape of both steam and water is immediately stopped. And, further, there is in connexion with this gauge a thermometer with a graduated scale, indicating not only degrees of temperature, but also the pressure of the steam in the boiler.

The water gauge consists of a small separate chamber, of any convenient form, placed in a vertical position opposite the water line in the boiler, and is of sufficient length to allow a float, contained therein, to rise and fall between the proper range of water line. The bottom part of the chamber is connected to the lower part of the boiler by means of pipes, and its upper part in like manner to the top of the boiler.

Fig. 30, Plate XV., is a vertical section, taken through the gauge, and will be sufficient to explain the improvements therein: *a, a,* is the cylindrical chamber, placed opposite the range of the water line in the boiler, and is connected by proper stuffing boxes to the glass tube *b*; and this is again connected, in a similar manner, to another tube *c*, which leads to the chamber *d*, connected with the bottom of the boiler; *e*, is the float, which, in this instance, is a hollow ball, buoyant on the surface of the water in the chamber *a*; it has a light rod *f*, of wood or other proper material, descending from it into the glass tube, its lower end being the index to point out the height of water in the boiler, which will be seen against the graduated scale *g*, divided so as to correspond with inches of altitude of water in the boiler. The chamber *d*, is connected to the bottom of the boiler by a flange on the short neck or pipe *h*; and between the flange, on the boiler, is placed a collar of non-conducting material at *i*, which may be of wood, paper, or other suitable sub-

stance, to prevent the heat communicating from the metal of the boiler to the pipe *c*. The chamber is furnished with a cock at *k*, by opening which, the gauge can be cleaned out from any deposit or sediment, the water being forced through by the pressure of the steam from above. By this arrangement, it will be seen that the water in the gauge is at all times comparatively cold, for the heat will not descend from the boiler to the chamber *d*, nor will it descend from the steam above the surface of the water in the chamber *a*, so as to affect the glass tube; consequently, the glass tube will not be subject to the great and sudden variations of temperature as those of the ordinary construction, when steam and water are admitted together into the glass tube.

In case the glass tube should, by any accident, become cracked or broken, the following means are provided for immediately stopping the escape of the steam and water:—On the under-side of the float *e*, a valve *l*, is placed, which, on the water in the chamber *a*, being forced out by the pressure of the steam, will, with the ball *e*, descend and rest on the seat at *m*, closing the aperture of the pipe; at the same time the pressure of steam in the boiler will force up the ball valve *n*, into the recess at *o*, and thus close that aperture, and thereby prevent the escape of water from the boiler. On shutting off the cock *p*, in the water pipe, and also the cock *q*, in the steam pipe, the parts of the couplings may be unscrewed, and a fresh glass tube immediately substituted, without stopping the engine.

And I would here remark, that instead of using the hollow float and its rod to indicate the height of the water in the glass tube, oil, or any other suitable material that will float on water, may be employed, and the line of separation between the two will indicate the height of the water against the graduated scale. The thermometer is placed at *r*, its tube being passed through proper stuffing boxes,

leaving the ball in the chamber *a*, where it is exposed to the steam, and the rise and fall of the mercury will indicate the temperature of the steam on one side of its scale, and the pressure of the steam in inches of mercury on the other, which scale is shown in an enlarged representation at fig. 31.

The improved mode of lubricating the axles and other parts of steam engines is shown at figs. 32, 33, and 34. It consists in the method of conveying the oil to the bearing parts of the axles, crank pins, connexions, or other parts of engines where it may be required, and is to be applied only in such situations where chambers can be formed within certain parts of the machinery, as in hollow shafts, connecting rods, piston rods, crank pins, &c. The improvement consists in using such hollow chambers as the receptacles for the oil, and conveying the oil therefrom to the part desired by means of small tubes, which may be supplied with cotton wick, or other capillary conducting substance, if necessary.

Fig. 32, is a section of a portion of one end of a hollow shaft or axle, showing the contrivance applied thereto in its simplest form; fig. 33, is another similar section of the same axle, after it has made half a revolution: *a*, is the hollow shaft or axle turning in the bearings *b*, *b*, to which bearings it is desired to convey the lubricating materials; *c*, is a small tube, open at both ends and inserted into the shaft, and protruding into the hollow chamber *d*, containing the oil, which is supplied through a cup or aperture at *e*, furnished with a cock or screw plug. There is also a small vent aperture at *f*, to allow the escape of air when the chamber is filling. The operation of the lubricating contrivance is as follows:—As the axle *a*, revolves, the mouth of the tube *c*, will be occasionally immersed in the oil, and a small portion will thereby be taken up and conducted by the tube to the bearings, thus supplying them with lubri-

sistency to be made into pills; and when the whole are well blended together, the compound is to be rolled and divided into pills in the usual manner.

"The dose I recommend is as follows:—Two pills to be taken by the patient at bed-time, and one in the morning, in ordinary attacks; but in severe and obstinate cases, the dose may be increased to three or four at bed-time, until relief be obtained."—[*Inrolled in the Rolls Chapel Office, July*, 1838.]

To Edouard Francois Joseph Duclos, *late of Sampson, in the kingdom of Belgium, but now of Church, in the county of Lancaster, gentleman, for his invention of improvements in manufacturing iron.*—[Sealed 20th October, 1837.]

In the words of the Patentee, "The nature of this invention consists in introducing and combining with cast iron, and with its scoriæ, while they are in a state of fusion, certain substances which, by means of their chemical action, detach from the cast iron the impurities which it contains, by forming with them volatile mixtures and compounds as well as scoriæ, which, though not volatile, are more fusible than those produced by the usual processes. These volatile matters, by mixing with the flame which fill the cavity of the furnace in which the operation is carried on, protect the iron from injury, while, at the same time, a metal is set free, in such proportions as are requisite to form, with the iron, an alloy which, both in physical and chemical properties, bears a close resemblance to the best qualities of malleable iron obtained by the use of wood charcoal. In the conversion of cast iron into malleable iron, it is the usual practice to pass it first through the process of refining,

and afterwards through that of puddling: my improvements apply to both these processes.

"For refining, I make use of a reverberatory furnace, such as is represented at fig. 26, Plate XVI., in which *a*, is the door through which fuel is introduced into the fire-place: *c*, and *b*, are the bars lying about the ash pit; *d*, is the bridge; *e*, the crucible; *f*, a door opening into the furnace a little above the crucible; *g*, the sole, being sloped towards the crucible; *h*, the chimney. The fuel employed in this furnace is blazing pit coal, and as soon as by means of it the sole *g*, has been brought to a white heat, I place on it thirty hundred weight of cast iron of good quality, and immediately afterwards I introduce into the crucible *e*, through the door *f*, a mixture of three hundred and thirty-six pounds of dry chloride of manganese, and six pounds and three quarters of bi-chloride of calcium, otherwise called bleaching powder; the quantity of these two ingredients being respectively in the proportions of ten per cent. and one-fifth per cent. compared with the quantity of cast iron employed. Over this mixture I put a layer of wood charcoal, about two or three inches in thickness, and cover this latter with iron scoriæ, otherwise called cinder, of a similar thickness, mixed with a sufficient quantity of quick lime to engage and combine with the free silica contained in the scoriæ. This being done, I bring up the heat of the furnace as fast as possible, till the cast iron, which had been previously placed in the sole, melts and runs down into the crucible, filling it up to within a few inches of the door *f*. The fusion of the cast iron being completed, its surface is to be covered with wood charcoal. The usual tools for working the melted metal are then introduced through the hole in the door *f*.

"During the working, portions weighing ten pounds each, of the same mixture of chloride of manganese and of

bleaching powder, as has been already described, are thrown in at intervals of about four minutes, according to the state of fluidity of the materials, the register of the chimney being closed for a few seconds after each addition. Care must be taken to keep the metal constantly covered with charcoal, and in about half an hour the process will have been completed, and the refined metal may be run out of the furnace in the usual manner.

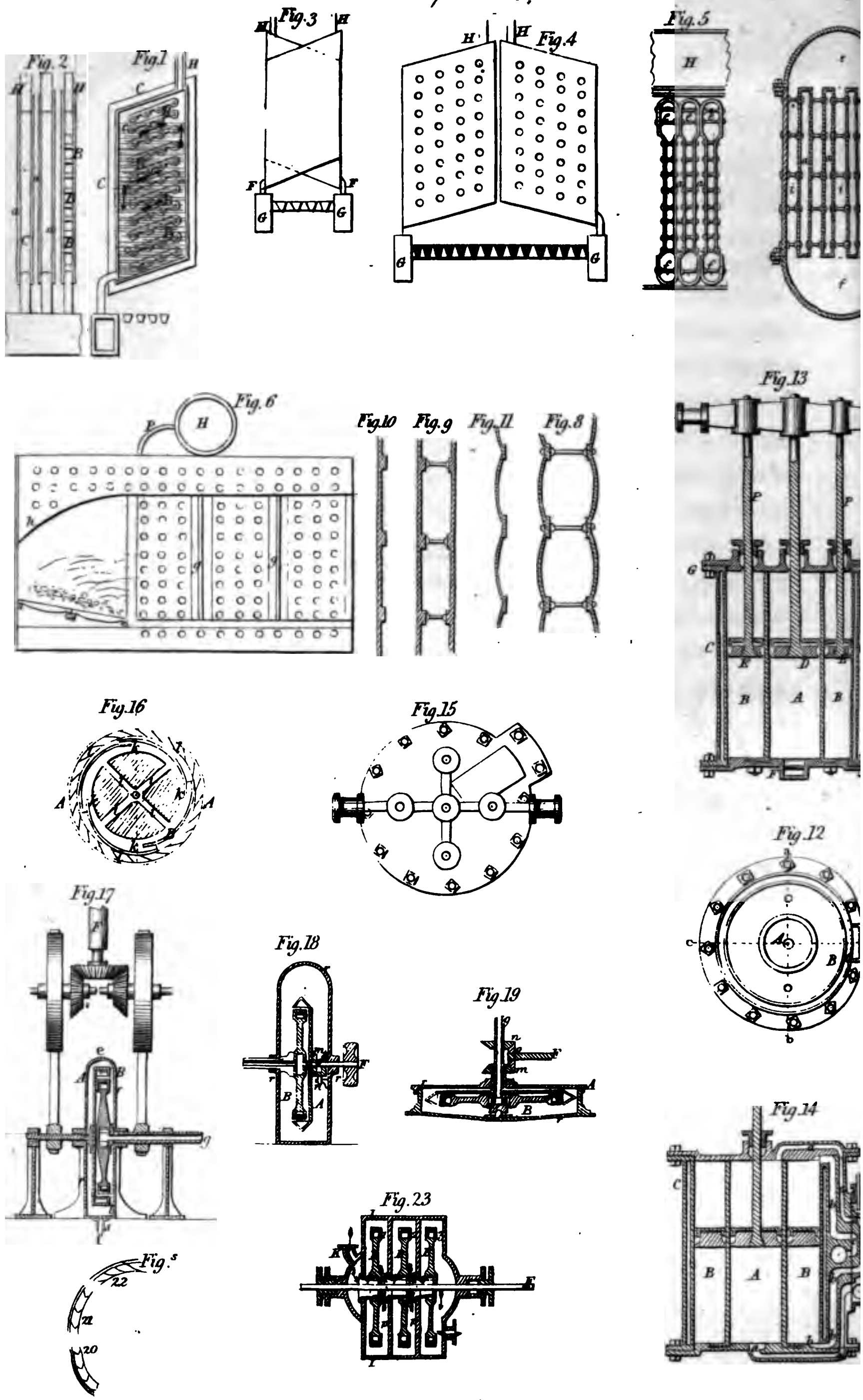
"The chemical action that takes place during the operation just described, appears to be the following:—The sulphur, the arsenic, and the phosphorus contained in the cast iron, unite with the chlorine of the chloride of manganese and of calcium, forming gaseous compounds, which are volatilized while part of the manganese unites with the iron. The scoriæ, consisting chiefly of silicates of iron, are partly decomposed by the concurrent action of the lime and charcoal, producing metallic iron and a fusible slag, consisting chiefly of silicate of lime, with some silicate of oxide of iron and silicate of oxide of manganese. The iron refined, as above described, is next to be submitted to the puddling process, which differs from that usually practised in the following particulars; namely, that about one per cent. of the mixture of chloride of manganese and of bleaching powder, already described, is thrown in from time to time during the operation, in order to prevent the injurious effect which the sulphur and other substances contained in the flame of the pit coal would otherwise have on the iron. Likewise, the carbonic acid contained in the flame is converted, for the most part, into carbonic oxide before it reaches the iron, by making the bridge of the puddling furnace double, or, in other words, composed of two parallel walls, and filling up the space between them with wood charcoal. When the metal has come into nature, as the workmen call it, the slag or scoriæ are let out, and then small charcoal is thrown

into the furnace, for the purpose of protecting the iron as far as possible from the injurious action of the flame, while in the act of being collected into lumps preparatory to shingling.

"I make no claim to the particular modifications in the form of the refining furnace and of the puddling furnace described in this my specification; but I claim the use and application in the conversion of cast iron into malleable iron of all those metallic chlorides which are capable of being so decomposed, that their basis shall combine with the iron, while their chlorine shall form volatile compounds with the sulphur and other impurities usually existing in cast iron. I also claim the use and application, in the conversion of cast iron into malleable iron, of all those metallic chlorides, the base of which, by combining with the earthy impurities of cast iron, converts them into slag, and thus facilitates their separation from the iron by means of such furnaces as those employed in the manufacture of iron for the place, and which are called wollow fires.

"After the slag has been let out, when the operation has come at that period which workmen term into nature, in order to obtain a metal more free from every atomic parcel of silex or cinders, which are almost always combined with the puddled iron, I take out from the puddling furnace the metal in that crystalline state of division, and submit it then to the action of a charcoal fire, of which the combustion is supported by a blast, common chaufferies charcoal, where it agglomerates or refines, and is then formed in bloom of a proper side, which are shingled: in order to avoid the inconvenience generally experienced in heating the iron in the following processes, by means of reverberatory furnaces, I heat those blooms of iron."—[*Inrolled in the Inrolment Office, April,* 1838.]

Gillman's Impts in Steam Boilers



Del.

1st Sept 1838

To WILLIAM GILMAN, *of Bethnal-green, in the county of Middlesex, engineer, for his invention of an improvement or improvements in steam boilers, and in engines to be actuated by steam or other power.*—[Sealed 17th August, 1837.]

THIS invention of an improvement or improvements in steam boilers, and in engines to be actuated by steam or other power, consists of five different heads or sections. The first is a novel or improved construction of chambers to form a steam boiler or generator, in which the water under ebullition is caused, by the peculiar form, arrangement, and construction of such chambers to circulate therein. Secondly, in improved arrangements and constructions of steam boilers, in which the several narrow chambers composing the same are furnished with compartments or chambers placed below the line of fire bars, for the purpose of receiving the sediment or deposit, which takes place in the same, whereby the inconvenience and injury caused by the burning of the bottom parts of such chambers is obviated, which injury takes place when the chambers are placed over the fire, and submitted to the direct action thereof. Thirdly, in an improvement in metal plates used in the construction of such steam boilers and other generators as are composed of narrow chambers, the side plates being rivetted to each other throughout their surfaces, and consists in rolling or forming such plates of metal with ribs or extra thickness at those parts where the plates are pierced for the rivets, in order to give additional strength thereto, which are otherwise weakened by the piercing of the holes. Fourthly, in an improved arrangement and construction of the cylinders and valves of steam engines, wherein the steam is worked expansively, that is, when the

represents the bottom part or sole of the shoe; fig. 4, exhibits the outer side of a boot constructed after the improved manner; fig. 5, is the inner side of the same; and fig. 6, is a view of the underpart or sole: *a, a*, in the six figures above referred to, represent the fore parts or vamps of the upper leathers; *b, b*, the hind quarters, which last mentioned may be of one piece of leather, or two pieces sewn together at the back, as usual. Between the fore and hind quarters are placed the elastic pieces, or gores or gussets *c*, and *d*, to which the vamp and the hind quarters are securely fastened by sewing; *c*, is the elastic gore for the outer side of the shoe, and *d*, is the elastic gore for the inner side. At the under part of the shoe or boot *e*, is the elastic portion of the sole placed between the rigid portions of the sole toward the toe part *g*, and the heel *h*. The several component parts or pieces of the upper leathers and gores *a, b, c*, and *d*, are shown extended and detached at fig. 7; and the same are represented as stitched together at fig. 8, and also in different views, exhibiting their inner and outer sides at figs. 9, and 10. The rigid leather parts of the sole and heel are shown detached, as they would appear on the under side, at fig. 11; and at fig. 12, is a representation of the piece of elastic material intended to be introduced between them for the purpose of connecting the sole and heel together.

The following is one of the modes which the Patentee pursues in manufacturing the improved boots and shoes, and will serve to show one practical method of carrying the improvements into effect:—The *insole* is formed of two pieces of the required shape (similar to the *sole*), which are first put upon the last in the usual way, with this difference only, that the part where the elasticity is required is left vacant, as shown in fig. 13; *i, k*, being the portions of the insole, and *l*, the vacant space or naked last. The upper

face, it parts with the superfluous water carried with it, which water returns by the descending passage E, thus maintaining a constant circulation of water within the chambers; F, is a pipe through which the chambers receive their supply of water from the vessel G, which is connected to the feed pump. This vessel may be of any suitable figure, and the chambers may be ranged along it as shown in fig. 2, the chambers being connected by pipes in the usual manner; but if they are placed side by side, crossing each other as shown in the elevation fig. 3, they will be connected to the vessels G, G, alternately on either side; or the chambers may be disposed in two separate series or ranges, as shown in the other elevation, fig. 4; H, is a pipe for conveying the steam from the chambers to a reservoir or steam chamber, to which all the several chambers composing the boiler are, in like manner, connected.

In concluding this head of the invention, the Patentee remarks, "I do not intend to confine myself, in this arrangement or construction of circulating chamber, to the use of flat parallel surfaces or side plates, as the spaces and passages may be either cylindrical or oval, and so formed by indenting or corrugating the plates with dies or other suitable means, and rivetting the opposite elevations together, or by partially indenting the plates, and making up the difference with intermediate pieces.

"Nor do I confine myself to the angle formed by the top and bottom to the sides, as the chambers may be square, and the intermediate pieces placed at the required angle within them: also, the intermediate pieces, instead of being inclined to the vertical passages D, E, may be placed in lines at a right angle to such passages; in which case, I obtain the necessary inclination of the intermediate pieces

for producing circulation, by inclining the chambers themselves. The chambers may also be worked full of water, and the separation of steam take place in a distinct vessel and the water there deposited returned by a pipe to the feed chamber G, for the supply of the vertical passage E, and the spaces connected therewith.

"And, further, I would remark, that these chambers may be made, as before described, of malleable metal plates, or they may be formed of cast iron in one piece, complete with the several passages and spaces, except the vertical passage E, which must be open throughout the whole length of the chamber, for the purpose of allowing the core to be extracted after casting the apertures at the ends, being afterwards made good by bolting on a suitable piece to flanges or other means, provided on each end of the open passage for that purpose."

The second improvement, viz. in the arrangement and construction of steam boilers, is shown in figs. 4, 5, and 6: fig. 5, is a transverse vertical section of part of a boiler, showing the form, construction, and arrangement of another kind of chamber for steam boilers, adapted for horizontal draft; fig. 6, is a longitudinal section taken through the boiler between a pair of chambers. The chief feature of novelty in these chambers, is the enlarged capacity of the top and bottom of each, so as to form the top and bottom of the flues *d, d*, as shown in fig. 5, the upper enlargement *e, e*, at the same time forming a water and steam chamber, which may be made of any required height; while the bottom enlargement *f*, forms a chamber for deposit or sediment below the fire bars, and, consequently, not subject to the direct action of the fire. Each of these enlargements is to be furnished with suitable man-holes, at either or both ends if required, for cleaning, or the lower

ones may each be furnished with a pipe, connecting them to a discharge pipe common to all, for blowing through. The side plates of the chambers are rivetted together by what are termed long rivetting, as shown in the sectional fig. 5, to enable them to withstand the pressure. The side plates may be flat, or they may be curved or corrugated between the vertical lines of rivets, as shown in the partial section of a boiler, figs. 8, and 9. If it is thought desirable, each of the chambers may be separated by transverse openings or flues in their narrow parts, as shown at *g*, *g*, in fig. 6; and, for convenience of manufacture, the chambers may be first formed in pieces or sections, and afterwards rivetted together to form the complete boiler; and if the chambers are formed in two pieces, a stop piece may be placed in the lower or sediment enlargement of the chambers, so as to cut off the communication with the other half, excepting at the upper part; in this case, the feed will be first thrown into the back half of the chambers, and the front supplied therefrom by the water flowing over from one chamber to the other, it having free communication through the steam and water chamber at the upper part. The upper enlargement of each chamber may be extended over the fire place, either in a direct horizontal line or curved, as shown at *h*, *h*, in fig. 6, and the bottom may be continued in like manner beneath the fire bars.

Each of the chambers is furnished with a pipe P, fig. 6, for conveying the steam to a reservoir or steam chamber H, from whence the engine is supplied. The supply of water may be conveyed by one pipe common to all the chambers, with connecting pipes branching therefrom to each chamber; but the Patentee does not confine himself to any particular form of the reservoir, or the mode of connecting the chambers to each other, nor to the mode of connecting the feed pipe thereto.

And further remarks, that the position of the boiler should be such as to permit any one chamber being taken out in case of defect, by merely disconnecting its feed and steam pipes, and replacing it by another chamber without disturbing the remaining ones. The whole series or rows of chambers may be kept together by long bolts, extending from side to side of the boiler on the outside, their ends passing through lugs attached to the two outside chambers, and the whole firmly secured by nuts or other means.

Another variation in the construction of this kind of boiler is shown in the cross sectional view at fig. 7, in which nearly the same effects are obtained as in the former, this being another mode of constructing and adapting narrow flues to the top and bottom enlargements or chambers. The chambers of the boiler may be formed with parallel sides, and made of any required length, height, and thickness, and open at their top and bottom parts to the upper and lower chambers *e*, and *f*, which, in this instance, are connected to all the middle chambers *i*, *i*. The upper and lower edges of the side plates of the middle chambers are connected together by angle iron, or in any other convenient manner, so that when they are united together, the angle pieces of the opposing sides of two chambers are made to lap over at top and bottom, and when rivetted together, will form the tops and bottoms of the flues *a*, *a*, *a*; but if the flues are required of greater width than angle iron will afford, a plate of the necessary width may be employed to connect the angle pieces by rivetting them thereto, or any other suitable means may be adopted.

A body of chambers thus connnected are formed into a complete boiler, with the exception of the furnace, by rivetting or bolting semi-cylindrical or other shaped top

and bottom chambers, as shown in fig. 7, to form steam and sediment chambers. The furnace may be formed in like manner to that described in fig. 6, by extending the steam chamber over the fire bars, and continuing the outside chambers towards the front. A sufficient number of chambers may be combined, as hereinbefore described, for a complete boiler; or the same may be formed by ranging several such combinations side by side, as is also the case with the simple chambers fig. 5, and the water being supplied and the steam conveyed to a reservoir in any convenient manner.

The third improvement, viz. in shaping or forming plates of metal for making steam boilers, generators, or receivers, is shown in the sectional figs. 10, and 11. Fig 10, represents a section of a plate of iron or copper, having ribs or projections *a*, *a*, *a*, rolled or formed thereon out of one and the same metal, at such distance apart, and of such width and thickness as the pressure which the plate is intended to sustain may require: the object of these ribs is to afford a greater substance for retaining the rivets more securely than common plate metal when parallel surfaces are rivetted together, as shown in figs. 8, and 9, or by short rivets in contact with the ribs; and further, for uniting parallel surfaces by welding, whether the spaces between the ribs are flat or curved, which is effected by bringing the ribs of two plates into contact, and there retaining them while they acquire a welding heat in a suitable furnace, when they are to be subjected to the pressure of a pair of rollers, or other suitable means adapted to the mould of the surfaces, and the process of welding will be completed. Fig. 11, sh
a section of a curved, grooved, or corrugated metal
with the extra thicknesses *a*, *a*, formed thereon, fig. 9,
a portion of a chamber formed with th

The Patentee states, "I claim, as my invention under these several improvements in the construction of steam boilers, first, the arrangement and construction of circulating chambers, first above described, with spaces or passages either at right angles, diagonal or inclined, to the ascending and descending passages, as hereinbefore described and illustrated, and which I denominate circulating chambers; secondly, the arrangement and construction of the separate chambers, furnished with enlarged parts or chambers for forming the tops and bottoms of the flues, and also forming chambers for deposit, not subject to the action of the fire, as described and illustrated by figs. 5, and 6; also the combination of chambers and flues, in the manner described and illustrated in fig. 7; and, lastly, the improvements in forming and constructing chambers for steam boilers, or for containing steam or water, with plates of metal having ribs or extra thicknesses formed at the parts pierced for the rivets, as described and illustrated by figs. 8, 9, 10, and 11."

The first improvement under the head of steam engines, applies to that description of engines in which the steam is worked expansively, or on the principle of Messrs. Woolf and Edwards' double-cylindered expansive engine; and by means of these improvements the complication of valves and pipes is avoided, and much economy obtained in the space occupied by the engine cylinders, and consists in placing one cylinder within another, with their steam passages so arranged that one slide valve only is necessary to conduct the steam into the first cylinder above and below the piston thereof, and from thence to the bottom or the top of the piston in the larger or external cylinder; and from this latter cylinder to the condenser, or to another cylinder if desired: fig. 12, is a horizontal sec-

tion of the two cylinders, showing their positions with the slide valve for changing the induction and eduction passages; fig. 13, is a vertical section taken through the cylinders in the line a, b, in fig. 12; and fig. 14, is another similar section taken through the cylinders in the line c, d; A, is the first or internal cylinder; B, the external one, with the outer casing or steam jacket C, C. The piston D, of the internal cylinder is of the common form, and attached to the cross-head by the piston rod in the usual manner; but the piston E, of the external cylinder B, must be of an annular form, seen in section in fig. 13: this piston has an additional packing on the inside, working against the exterior surface of the cylinder A. The annular piston has two or more piston rods P, P, properly keyed to the same cross-head to which the piston rod of the internal cylinder is attached; by which means the power is concentrated, and is, consequently, more convenient in its application than the piston rods of two separate cylinders can be made. The foundation plate or bottom F, and likewise the covers G, of these cylinders, are common to both, and it is desirable that the joints should be composed of well-finished surfaces to insure correct fitting. The jacket is intended to keep up the temperature of the external cylinder, to compensate the expansion of the internal one.

The vertical section, fig. 14, shows the valve H, and the alternate induction and eduction steam passages *a*, *a*, and *b*, *b*: these, together with the working of the valve, will be readily understood by inspection of the drawings. The cylinder A, is supplied with steam from the valve chest or steam box in the usual manner; *c*, is the steam pipe leading from the boiler. The valve H, has two passages, one *d*, for transferring the steam from the cylinder A, to the larger cylinder B; and the other passage *e*, for con-

ducting the steam from the cylinder B, to the eduction steam pipe L. The movements and operation of this valve will be readily understood by any practical engineer, and needs no further description.

The Patentee does not intend to confine himself to the placing of only one cylinder concentric within the other as described, as he proposes to use three cylinders placed concentrically in like manner, when it is desirable to equalize the power more nearly from the commencement to the termination of the stroke, than can be effected by two cylinders, especially where no fly-wheel can conveniently be employed; in which case a portion of the intended expansion of the steam takes place in the second cylinder, and its complete expansion in the third; in this case there will, of course, be two annular pistons, and three sets of steam passages or ways arranged and conducted from the bottoms and tops of the three cylinders, in like manner to that shown in the figures; through which arrangement of passages the steam may be worked by one slide valve as before, which necessarily must have three conducting passages, arranged also in like manner to the passages in the valve before described. Nor does he confine himself to the use of two piston rods for each of the annular pistons, as four may be employed cottered to the piston at the four quarters, and keyed to a cross-head furnished with arms, as shown in fig. 15. If three cylinders are employed, the arms of the cross-head will, of course, lengthen sufficiently to connect the piston rods of the second annular piston thereto in like manner.

The Patentee also states, that he does not confine himself to any particular mode of fixing the internal cylinder, nor to the bottom plate and top cover, being each made in one piece; but I "claim the placing of one steam cylinder

within another, and also the conducting of the steam for the purposes of the two cylinders, by means of one valve, as hereinbefore described."

The next improvements as applied to that description of rotary steam engines acting upon the principles of "Barker's mill," or rather of the ancient engine of Hero, and known more recently as Avery's steam engine, wherein motion is obtained by the re-action caused by steam flowing freely from apertures in the periphery of a drum or wheel, or from the extremities of tubular arms placed at a right angle, or nearly so, to the radius of the revolving body, are shown in figs. 16 to 23 inclusive.

Fig. 16, is a transverse vertical section, taken through the engine at the dotted line e, f, fig. 17, which is a longitudinal vertical section of the same; A, B, are the two wheels composing the engine, mounted on separate shafts. The hollow shaft *g*, of the engine is mounted, turning in proper bearings in the framework: upon this shaft the wheel B, is fixed. The end of the hollow shaft is connected to the steam supply pipe by any of the usual means of coupling; the shaft conveys steam to the centre of the wheel B, whence it is distributed to the annular or ring-shaped channel *h*, *h*, at the circumference, by means of the passage *i*, *i*, fig. 16; and from thence it flows freely through the apertures *k*, *k*, in the periphery, and meeting the partitions or vanes *l*, *l*, in the other wheel A, consequently will drive that wheel the reverse way to that in which the wheel B, is travelling; *r*, *r*, is an outer casing furnished with a pipe *s*, to conduct off the escaping steam. As various forms of revolving arms, drums, and wheels have been used or projected by others, the Patentee states, "I do not consider the steam wheel B, as above described, as forming any part of my invention, nor do I confine myself to the use of any particular

form or construction of such wheel, but I consider my invention to be the application and adaptation of the concentric wheel A, the ring of which moving in the same plane as the steam wheel, is furnished with the vanes or partitions fitted into the recess formed in the wheel, the position of the vanes being clearly shown in fig. 16."

The operation and effect of this engine is as follows:—Steam flows freely from the apertures *k*, imparts only a portion of its velocity to the revolving body from whence it issues; consequently, the amount of velocity not imparted may be employed with the same effect as steam issuing from a fixed orifice with a like velocity; this velocity I therefore apply to impel the concentric vane wheel A, by delivering the escaping steam thereon, which wheel moves of course in an opposite direction to that of the apertures: these motions I combine in the main driving shaft F, by any well-known mechanical means, as exhibited in fig. 17, to which, in this instance, the power is conveyed by the agency of straps and drums.

Fig. 18, is another modification of this improved construction of rotary engine wherein the concentric vane wheel is mounted, turning freely on the axle or shaft of the steam wheel; and the motions of the two wheels A, and B, are combined by means of the three bevil wheels *m*, *n*, *o*; the wheel *m*, being fixed on the boss of the vane wheel; the intermediate wheel *n*, revolves on a pin, and has its axle supported by means of a bracket attached to the frame-work; the other bevil wheel *o*, is fixed to the steam wheel shaft, thus combining and concentrating the power of the two wheels A, and B, in the driving shaft F, from whence it may be taken by a band and rigger, or any other convenient means.

Fig. 19, is a section of an application of this modification

placed in a horizontal position, wherein the hollow shaft of the steam wheel B, passes through another hollow shaft, on which the vane wheel A, is mounted; the motions of these shafts are combined, and their power concentrated in the driving shaft F, through the medium of three bevil wheels, in the manner before described.

This engine is also applicable to water power, the water issuing from apertures of proper dimensions (as in the machine known as "Barker's mill"), impinges on the vanes of the concentric wheel, which it impels in like manner to that before described of the issuing steam.

Figs. 20, 21, and 22, exhibit different forms of vanes, and their position in the ring of the wheel A, which will be understood by inspection of the drawings.

It is desirable that the edges of the vanes should be presented to the issuing fluid, as shown in fig. 16. The form of the recess in which the vanes are placed may be either that of a square, as shown in fig. 17; angular, as in figs. 18 and 19; or of a curved figure.

The next improvement in rotary engines, is a combination of the foregoing improved engines for working steam expansively on the principle of operation of the said engines.

Fig. 23, is a longitudinal section of an arrangement of engine formed and adapted to this purpose: I, I, is a tight casing divided by partitions P, P, into the several chambers marked Nos. 1, 2, 3; a steam wheel B, such as I have before described, or of any other suitable form, is mounted in each chamber on the main shaft F; each wheel has a hollow collar *g*, working in conical fittings in the respective partitions. These hollow collars conduct the steam from the chambers to the interior of the wheels. The steam being admitted by the pipe K, flows into the centre

of the wheel in No. 1, and escapes into its chamber by the apertures in the periphery in the manner of the engines before described. No. 1, chamber thus becomes a reservoir for the supply of the steam to the wheel in No. 2, and chamber 2, a reservoir to the wheel in No. 3, and so on, continued throughout any number of chambers of which the machine may be composed; which number is limited only by the pressure of the steam in the boiler, and the relative difference of pressure maintained between the steam in the several chambers, as will be hereafter explained.

The Patentee here remarks, that "no advantage would result from combining a series of chambers and wheels in this manner, were the apertures of all the wheels alike equal in amount of area; but the advantage gained by such combination arises from so adjusting the area of the apertures in each wheel successively, as will maintain any relative difference of pressure between the steam in the reservoirs or chambers as may be determined upon, and combining so many wheels and reservoirs as will exhaust the expansive power of the steam previously to its discharge into the atmosphere or to a condenser. Thus, suppose it be determined to supply steam by the pipe K, of 80lbs. pressure per inch, and that the relative difference between the reservoirs shall be 10lbs., as 70lbs. in No. 1, 60lbs. in No. 2, and so on progressively throughout a series, which I will assume in this case to be 8 in number. It is manifest that with every reduction of pressure, a corresponding increase will take place in volume by expansion; and that for passing this increased volume from one chamber to another, and preserving at the same time the relative difference of pressure as above noted, depends entirely upon a proper adjustment of the apertures or ways: this being

accomplished, a uniformity of velocity will be maintained throughout the series.

"If, then, it be assumed that steam expands in the same ratio as atmospheric air, and, consequently, that the elastic force of the steam in the last reservoir of the series is reduced by expansion to 10lbs. per inch, it has arrived at an increase of volume equal to eight times its original bulk: hence it follows that the apertures of the last wheel, in order to allow the amount of volume to pass, must be eight times greater than the area of the apertures in the first wheel, and consequently will have eight times the re-acting power.

"Now, as expansion commenced in chamber No. 1, and progressed throughout the whole series, the aggregate amount of power produced, calculated on the ratio of atmospheric expansion, will be about two and two-thirds of that which would result from passing the steam through a single wheel.

"Having thus described the object of the combination, and the effect in its simplest form, I would remark, that I increase its power by mounting vane wheels A, A, on the main shaft in each chamber or reservoir, with its gearing as described in the modification, fig. 18; but such addition is optional.

"I claim under this head of my improvements, first, the application of the concentric wheel fitted and applied with vanes or partitions as hereinbefore described, both for water and steam power; also the mechanical means for combining the motions of the wheels, and concentrating their power in the driving shafts as severally described; and, secondly, the working of steam expansively in a series of these rotary engines, by so adjusting the apertures of the steam wheels in a combination of engines and chambers or reservoirs, as illustrated by fig. 23, in order to main-

tain as nearly as possible any determined difference of pressure between the reservoirs, and such a number of wheels and chambers or reservoirs as will nearly exhaust the whole power of the steam working the engine."—[*Inrolled in the Rolls Chapel Office, February,* 1838.]

Specification drawn by Messrs. Newton and Berry.

SCIENTIFIC NOTICES.

REPORT OF TRANSACTIONS OF THE INSTITUTION OF CIVIL ENGINEERS.

(Continued from p. 307.)

February 20, 1838.

The President in the chair.

The Minutes of Conversation having been read, some discussion arose on the reliance to be placed in the indications of the thermometer, when the changes of temperature are great and sudden. It was observed, that the mercury of the thermometer requiring time to lose and acquire heat, the variations in the pressure due to the change of temperature would be indicated with far greater certainty by a column of mercury; but that the thermometric gauge would be free from the oscillations accompanying the mercurial column under similar circumstances, which rendered such observations inaccurate.

The President remarked that, as the subject of Cornish engines had usefully occupied the attention of the institution for part of several evenings, he thought it right to remind the meeting of the obligation due to Mr. Wicksteed, by whom it was introduced, through the medium of his first paper, written after his return from a professional visit for the East London Water Works Company, and read at a former session. After the reading of this paper, doubts were expressed as to the correctness of

some of the results, as they so far exceeded those of the common condensing engine; and it was suggested, that until full experiments were made, by pumping water and measuring it, or raising weights and weighing them, the doubts were likely to remain. Mr. Wicksteed again visited Cornwall, when he made other experiments, and weighed the water and weights in the way described in his report; and the result was, the very valuable paper which had given rise to these discussions. So far as he knew, Mr. Wicksteed was the first who had weighed the water raised in this large way. The consequence probably was, the removal of many of the doubts which had been previously entertained of high steam and working expansively. The increased effect of high steam, when worked expansively, was well known to Watt, and is evident, if the action of the elastic fluid in the cylinder be considered; but the danger which appeared to be attendant upon high steam, when the means for preventing that danger by improved machinery and boilers were less perfect than at present, prevented him from adopting it. In pumping, then, and in most rotary engines, there was an evident saving by using the high steam, shutting off and working expansively; but there appeared some irregularity in the motion in expansive working for very fine machinery. Mr. Jackson, of Leeds, had surprised him by saying, that by cutting off the steam in a low-pressure engine, even at $\frac{4}{5}$ths of the stroke, the effect of the irregularity was sensible, by breaking the very fine flax thread manufactured by Messrs. Marshall. He thought it right to make these remarks in expressing his thanks, which he was sure were due to Mr. Wicksteed for his valuable communications, and he hoped that his example would be remembered by those engineers who were employed in similar professional inquiries.

In reference to the preceding remark on the effect of cutting off, it was stated that several engines in Lancashire, driving fine cotton machinery, were now working more or less expansively without inconvenience. That the irregularity spoken of was easily overcome by heavier or more rapidly-revolving fly-wheels, or by two engines coupled together.

On the Expansive Action of Steam in Cornish Engines. By W. J. Henwood.

At the commencement of this paper, the author describes, with great detail, the action of the indicator, and the nature of the evidence which it furnishes on the working of an engine. The author then states the results arrived at on applying the indicator to the cylinders of some of the best engines in Cornwall. The peculiar circumstances of each case, as the clothing of the boilers, steam pipes, and the various methods adopted for keeping up the temperature of the cylinder, are detailed. The steam cases or jackets of some of the engines were filled with dense steam from the boilers, of others with heated air. The dimensions of the working parts and the loads of the engines, the water and steam in the boilers, the temperatures of the hot well of the condensing water, of the boiler shed, engine house, and external air: the duration of the experiments; the coals consumed, according to weight and measure; the quantity of oil and grease; the number of strokes; the duration of each experiment, and the pressures of the boiler and cylinder, are tabulated for the respective engines.

The greatest duty performed by the measured bushel, by 84 lbs. damp, and by 84 lbs. dry, is respectively 86½, 72½, and 77½ millions.

This paper also contains a calculation, as to the expense of performing a given quantity of work, and it appears that a proper allowance being made for the coal, grease, and oil consumed, there was raised by Huel Towan engine 1085 tons, and by Binner Downs 1006 tons, one foot high for one farthing. According to this result, the weight of a man (1½ cwt.) would be raised ten miles for a penny.

On the Dry Meter. By S. Clegg.

This instrument, originally designed for measuring gas, may be applied to other useful purposes, as to register the average pressure of high-pressure steam, the average temperature of heated air, or the average of any variable temperature for any period. The principle of action in this instrument, is the evaporation of

spirits of wine, which is well known to vary *directly* as the heat. The spirit of wine is contained in a pulse glass, the connecting stem being bent round, so that the two bulbs are brought nearly into contact with each other; the glass revolves about an axis perpendicular to its plane, the axis being so placed, that when the upper glass is filled with the spirit, the centre of gravity should be a little beyond the vertical, through the point of suspension, and, consequently, the upper bulb descends. In the framework o the instrument are two orifices, opening directly on the upper and lower bulbs, but of different areas, the lower orifice being somewhat the larger: through these orifices, currents of gas are passed by means of tubes, the gas having been previously conducted to the under side of a gas burner, so that the gas in its passage may be heated. It is then ascertained by actual experiment, what quantity of heated gas will cause the spirits from the lower globe to be driven into the upper one; this once ascertained, may be always depended upon. The spirit of wine having ascended from the lower to the upper globe, the descent of the upper one gives motion to wheel work, whereby the number of these oscillations, and consequently the number of volumes of heated gas which have passed through the tubes, may be registered.

February 27, 1838.

The PRESIDENT in the chair.

Some discussion took place on the method of preparing charcoal, which might be burnt without danger. It was stated that charcoal, broken into small pieces, and steeped in a mixture composed of two gallons of water, one pound of quick lime, and ten ounces of salt, could be burnt at a slow rate, without the evolution of carbonic acid gas being sensible. It is known that lime will never absorb more than from 62 to 64 per cent. of the carbonic acid gas of which it has been deprived by burning; also one pound of charcoal will, during combustion, produce as much carbonic acid as can be absorbed by three pounds of lime.

On the Thermometric Steam Gauge. By Mr. Adie.

A letter was read from Mr. Adie, on his improved form of this instrument. He uses strong bulbs, and cements the tubes into a brass collar, so as to be firm and perfectly tight. The tube being fastened at no other point, suffers no injury from the contraction and expansion of the scale. The standard scale was graduated as follows:—A mercury column, and one of the thermometric steam gauges, carefully graduated to temperature, according to Fahrenheit, were attached to the boiler of a locomotive, and the temperature for given pressures being accurately noted, a scale was obtained by which the thermometric gauge is now graduated to pressures without any degree of temperature. The omissions of the graduations for the temperature, is found convenient in practice. This letter was accompanied by one from Mr. Woods, the resident engineer of Liverpool and Manchester, in which Mr. W. states, that he has used the gauge on the locomotives on that railway during the last two years, and found it a very accurate and convenient instrument.

On the Brick Beam at Nine Elms.

Two communications on the brick beam were read, the one from Mr. Charles L. Francis, and the other from Mr. Hemans.

These papers, which were accompanied by drawings, described the general structure, and the breaking of the beam. The beam consisted of nineteen courses of brick, laid in cement, gauged with equal portions of clean sharp river sand Between the first and second, and three succeeding courses, three lengths of an inch-and-a-quarter iron hooping were extended from end to end. Between the sixth and seventh courses two hoops were inserted, and between the eighth and ninth only one length, in all fifteen lengths. The distance between the piers was 21 feet 4 inches; the depth of the beam 4 feet 9 inches, and its thickness 2 feet, for the first six courses, and 1 foot 7 inches for the remainder. There was a slight deflection of about one-eighth of an inch from the first. The load was suspended in a cradle, being as nearly as possible in the centre, and when it amounted to 22 tons, 12 cwt. 1 qr. the piers slightly diverged, and the beam cracked

exactly in the middle, opening like the hinge of a rule, and the fracture being clean and sharp, the cut being through both the cement and brick, as if a solid block had been rent. Eleven of the iron hoops broke as short as the bricks themselves, and four drew out of the opposite face of the fracture, the longest by about five inches.

Mr. Francis is of opinion, that the hoop had little to do in imparting strength to the structure—that the principle of tension could not be brought into play, since the adhesion being supposed perfect, there cannot be tension of one material without the other. Now cement is elastic and inextensible, consequently the moment the elastic strain of the iron is called into play, the adhesion is irrevocably disturbed. The iron then being prevented from extending, may be considered as wrenched asunder by the same force as that to which the incorporated mass yields.

A long discussion ensued, as to the effect of the iron in sustaining the load. The closeness of the fracture proves the perfect adhesion of the iron and the cement, but the quantity of iron was too small to form a fair trial of the value of this mode of construction. The adhesion betwixt the iron and the cement being complete, the iron could not take the load unless by the yielding of the cement. Hence, the different tiers of iron hooping may be considered as rent asunder in succession by the momentum of the mass, after the cement had yielded.

Mr. Mushet presented some specimens of malleable iron, in his opinion particularly adapted for railway purposes. The feature peculiar to this iron, is the omission of the refining process in its manufacture. The valuable properties of malleable iron being fibre and hardness, Mr. Mushet considers that these are but imperfectly secured by the present process; iron, as at present generally manufactured, receives the fibre from repeated heating and rolling. But fibre thus acquired, is acquired at the sacrifice of hardness. The fibre of malleable iron may be injured by overheating, by adding in the smelting furnace ores rendering the iron cold-short, or by the use of cinders, which, when in excess,

cause the fibre to crystallize and produce brittleness. Some irons, however, are so exceedingly fibrous, that they admit of a limited use of cinders without deterioration. By omitting the refining process, a greater mass of fibre can be produced than by any other means, and this fibre, in consequence of the iron not being exposed to so severe a degree of decarbonization, is stiffer and harder than that acquired by repeated heatings and rollings. The iron used for railways should be from good grey pig iron, as the source from which the hardest and strongest fibre in malleable iron is derived. The use of cinder pig should be excluded, on the ground that the quantity and quality of the fibre is injured, and if in the state of grey iron, its fusibility is so much increased as to occasion great waste in puddling and re-heatings.

March 6, 1838.

The President in the chair.

On the Evaporation of Water from Steam Boilers.

By Josiah Parkes, M. Inst. C. E.

In this paper, the author has brought together all the well-authenticated documents relating to the power of coal in producing steam, and thus exhibited, at one view, the present state of this department of science.

In the course of a series of experiments, undertaken with the view of diminishing as much as possible the loss and nuisance arising from the volumes of unconsumed smoke and soot which are emitted from the chimney, it appeared that, for effecting this purpose, the air necessary to render the smoke combustible must be given directly to the uninflamed gas, and not allowed to become vitiated by passing over inflamed fuel; that it must be administered at the point of greatest heat, the temperature of incandescence at least being necessary for its inflammation. Mr. Parkes was led therefore to admit the air at the bridge of the furnace. The effect of different modes of fire being observed, it appeared that less smoke was emitted from less frequent than from more frequent firing—that more water was evaporated by the same

weight of fuel—and that fewer cinders and less scoria were produced. Pursuing this principle he was led to work the engine with two charges of coal per day; the furnace being loaded at first in the morning as rapidly as keeping up the steam would permit, and then again at dinner time. On this plan, great economy was obtained, which was increased still farther by enlarging the furnaces so as to enable them to contain the entire fuel requisite for one day's consumption. The consequence was, that from 7 o'clock in the morning no smoke was visible; the dampers were kept very close down, and the steam not varying one-eighth of an inch during many hours. At dinner time the dampers were as closely shut as safety would permit, and a large quantity of water supplied. At night, when the engine was stopped, fresh water was supplied; thus the heat of the flues was taken up, and waste consequent on blowing off avoided. The boilers were well clothed, there was little loss of heat during the night. Mr. Parkes then describes in detail the method of firing which he had been led to adopt, and which was attended with such beneficial results, and by pursuing which he was enabled to evaporate 10·2 lbs. of water at a temperature of 212° by 1 lb. of coal, whereas the man of the ordinary system of firing is only 7·5 lbs. of water, evaporated by 1 lb. of coal. The greatest evaporation was 18½ cubic feet of water, at a temperature of 212° for 112 lbs. of coal. In order to raise steam with economy, the surface of water in the boiler ought not to be less than 10 square feet per horse power; the usual allowance in Lancashire is 7½ square feet; and 5 feet by Messrs. Boulton and Watt. The surface exposed to heat in waggon-shaped boilers is, respectively, about double these quantities, exclusive of any internal flue.

The system above described was subsequently made the subject of a patent, and applied to more than 500 furnaces, but has fallen in a great measure into disuse, simply from the fact that it depends on the fireman, and the master will not take the trouble of understanding it in order to save a few coals. This was precisely the case with the Davy lamp. The miners persisted in working

in constant danger and with imperfect light, rather than adopt a contrivance requiring a small amount of trouble and care.

The author then points out some facts, with which we are at present unacquainted, but which are of the greatest importance to practical science—as some measure of the absolute quantity of caloric in a pound of coal or other combustible; the proportion in which air and fuel unite during combustion; the relations betwixt the combustible and the supporter of combustion; the relative heating power of the solid and gaseous portions of the coal, as exhibited in all the intermediate varieties from anthracite to cannal; the latter of which has been known to emit 85 per cent of gas. Experiments are also wanting on the relative heating power of coal and coke. Mr. Parkes has found that 75 lbs. of coke produced from 100 lbs. of St. Etienne (French) coal, evaporated as much as 100 lbs. of the same coal. The explanation of this fact is seen on considering that the heat of combustion does not depend solely on the combustible, but on the quantity of oxygen united with it.

The paper is accompanied by several tables; the first table shows the results of a great number of experiments in London and Lancashire, on the common or waggon-shaped boilers, fired on the old and the author's system. It exhibits the weight of coal consumed in raising the water to 212 degrees, and in evaporating it from that point; and shows the effect to be attributed to the gaseous and carbonaceous matter.

In the second, the water evaporated by the Cornish boilers, at the United mines, during the last eight months, is recorded. It appears that the greatest is 15.3 lbs., the least 9.6 lbs., and the mean of all the experiments is 11.8 lbs. of water evaporated from a temperature of 212 degrees, with 1 lb. of coal. The result of Mr. Henwood's experiments, as detailed in his paper, is 14 lbs. of water evaporated with 1 lb. of coal.

The third table, founded on the experiments of M. de Pambour, contains the quantity of water evaporated in locomotive boilers; the mean of these experiments appears to be 5.6 lbs. of

water for 1 lb. of coal, on the assumption that $\frac{8}{10}$ths of a lb. of coke is equal in strength to 1 lb. of coal.

The fourth table gives a comparative view of the whole, which shows that the value of the mean of the Cornish, Warwick, London, Lancashire, and locomotive experiments respectively is 21, 18½, 14, 13¼, 10 cubic feet, evaporated by 112 lbs. of coal, from water at 212 degrees.

The waste of heat arising from not covering boilers and steam pipes is also shown by direct experiment. The author invites experimenters on this subject to supply, in every instance, the following information:—The form and dimensions of the boilers; the area of the grates; the surface exposed to heat, distinguishing the area of that exposed to receive the radiant from the communicative heat; the temperature of the water entering the boilers; the exact weight of coals burnt; the exact weight or easure of water evaporated; the duration of the experiment.

List of Patents

Granted by the French Government from the 1*st of October to the* 31*st of December*, 1837.

PATENTS FOR FIFTEEN YEARS.

To Charles Henry Stedman, of London, represented in Paris by Mr. Perpigna, Advocate of the French and Foreign Office for Patents, Rue Choiseul, for improvements in meters used for measuring gas or liquids.

— Miles Berry, civil engineer, of London, represented in Paris by Mr. Perpigna, for improvements in the preparing or manufacturing of a certain colouring substance.

— Joseph Jones, of Manchester, represented in Paris by Mr. Perpigna, for an improved method of using certain colours in the printing of calicos.

— Henri Bernard Chaussenot, represented by Mr. Perpigna, for an improved controller for reckoning the number of persons entering in omnibuses.

To Romagny Junior, of Rheims, represented by Mr. Perpigna, for improvements on the Jacquard loom.

— Henry Bernard Chaussenot, represented by Mr. Perpigna, for an improved apparatus for preventing the explosion of boilers.

— Gabriel Massé, of Mareuil, represented by Mr. Perpigna, for an improved knitting frame.

— Henry de Sassenay, of Paris, represented by Mr. Perpigna, for a new method of towing boats.

— Noel Magny, of Paris, represented by Mr. Perpigna, for an improved lever.

— Alexander Prince, of London, for improvements in steam boats.

— Delacroix Saint Clair, of Orleans, for an improved vice for manufacturing the heads of pin nails.

— Eugene Philippe, of Paris, for an improved steam coach.

— Louis Molinié, of St. Pons, for a machine for cutting corks.

— Jules Hossard, of Angers, for an improved kind of stays for straightening any deviation in the figure of young ladies.

— Martin Chatelain, of Rouen, for a brick-making machine.

— Martinand de Preneuf, of Paris, for a new kind of bath.

— Jean Pierre Raymond, of St. Vallier, for an apparatus for decomposing water by means of charcoal.

— Daniel Dunn, of London, for improvements in generating steam.

— Madame de Girard Romagnac, of Paris, for a new process and apparatus for manufacturing sugar.

— Jean Baptiste Falgnière, of Marseilles, for a new machine for making leaden or other metallic pipes.

— Louis Brunier, of Paris, for a new process for producing a vacuum.

List of Patents

Granted in Scotland between 22d July and 22d August, 1838.

To Joseph Bennett, of Turnlee, near Glassop, Derbyshire, cotton-spinner, for certain improvements in machinery for carding

wool, cotton, flax, or other fibrous substances, which are or may be carded, part of which improvements are also applicable to machinery for drawing, doubling, roving, and spinning such fibrous substances as are or may be subjected to these operations.—26th July.

To Richard March Hoe, late of New York, now residing at the Office for Patents, Chancery-lane, London, civil-engineer, in consequence of a communication made to him from Dr. H. H. Sherwood, of New York, for a new or improved instrument or apparatus for ascertaining or determining the latitude and longitude of any place, or the situation of ships or other vessels at sea; and the dip and variation of the magnetic needle, which new or improved instrument he intends to denominate Sherwood's magnetic geometer.—26th July.

— Richard March Hoe, late of New York, now residing at the Office for Patents, Chancery-lane, London, civil-engineer, for certain improvements in machinery or apparatus for grinding and polishing metal surfaces.—28th July.

— William Barnett, of Brighton, iron-founder, for certain improvements in the production of motive power, and in the manufacture of iron.—31st July.

— Richard Badnall, of Cotton-hall, Staffordshire, for a certain improvement in the manufacture of carpets and other similar woven fabrics, which improvement is effected by the introduction of a certain article of commerce not hitherto so employed or used in such manufactures.—31st July.

— Richard Treffry, of Manchester, chemist, for certain improvements in machinery for preserving certain animal and vegetable substances from decay, and also in the apparatus for and mode of impregnating substances to be preserved.—6th August.

— Robert Sandiford, of Tottington, lower end, Lancashire-beach, printer, for certain improvements in the art of block-printing, and in certain arrangements connected therewith. —7th August.

— John Thomas Betts, of Smithfield-bars, London, rectifyer, in consequence of a communication made to him by a foreigner

residing abroad, for improvements in the process of preparing spirituous liquors in the making of brandy.—9th August.

To Henry Bessemer, of City-terrace, City-road, London, engineer, for certain improvements in machinery or apparatus for casting printing types, spaces, and quadrats, and the means of breaking off and counting the same.—9th August.

— Peter Fairburn, of Leeds, machine maker, in consequence of a communication made to him by a foreigner residing abroad, for certain improvements in looms for weaving ribbons, tapes, and other fabrics.—10th August.

— Sir James Caleb Anderson, of Buttevant Castle, in the county of Cork, for certain improvements in locomotive engines, which are partly applicable to other purposes.—18th August.

— David Cheetham, of Staley-bridge, Cheshire, spinner, for certain improvements in the means of consuming smoke, and thereby economising fuel and heat in steam engine or other furnaces or fire places.—22d August.

— James Robinson, of Huddersfield, Yorkshire, merchant, for an improved method of producing, by dyeing, various figures or objects of various colours on woollen, worsted, cotton, silk, and other cloths.

New Patents
SEALED IN ENGLAND.
1838.

To Wilton Wood, of Liverpool, in the county of Lancaster, merchant, for his invention of an improved method of making bands and tackling to be used in drawing, turning, or carrying machinery.—Sealed 26th July—6 months for inrolment.

To George Holworthy Palmer, of New-cross, in the county of Surrey, civil engineer, and George Bertie Paterson, of Hoxton, in the county of Middlesex, engineer, for their

invention of certain improvements in the mode of preparing, constructing, and adapting certain parts of gas meters. —Sealed 28th July—6 months for inrolment.

To Andrew Paul, of Doughty-street, St. Pancras, in the county of Middlesex, surgeon, A. B. and M. B., for his invention of an improved hydraulic pump, douche, or jet d'eau, applicable to all the purposes of lavement in medical operations.—Sealed 30th July—6 months for inrolment.

To Robert Hendley, of Belgrave-street, St. Pancras, in the county of Middlesex, doctor of medicine, for his invention of a metallic concrete capable of being, by means of fire, cast into a variety of forms, and applied to a variety of purposes, for which iron, lead, zinc, copper, and other substances, have been heretofore used.—Sealed 30th July —6 months for inrolment.

To Samuel Hall, of Basford, in the county of Nottingham, civil engineer, for his invention of improvements in steam engines, heating or evaporating fluids or gases, and generating steam or vapour.—Sealed 30th July—6 months for inrolment.

To Joseph Rayner and Joseph Whitehead Rayner, of Birmingham, in the county of Warwick, civil engineers, and Henry Samuel Rayner, of Ripley, in the county of Derby, civil engineer, for their invention of improvements of machinery for roving, spinning, and twisting cotton, flax, silk, wool, and other fibrous materials.—Sealed 31st July —6 months for inrolment.

To Edward Heard, of Bateman-buildings, Soho-square, in the county of Middlesex, manufacturing chemist, for his invention of certain improvements in oxydizing lead, and converting the same into pigments, or white and red lead, and manufacturing part of the products arising from these processes into soda.—Sealed 1st August—6 months for inrolment.

To George Marquis of Tweeddale, for his invention of

an improved method of making tiles for draining soles, house tiles, flat roofing tiles, and bricks, to extend to the colonies only.—Sealed 1st August—6 months for inrolment.

To Edwin Whele, of Walsall, in the county of Stafford, tallow-chandler, for his invention of an improvement or improvements in the manufacture of candles.—Sealed 1st August—6 months for inrolment.

To John Dennett, of New-village, in the Isle of Wight, in the county of Hants, engineer and surveyor, for his invention of improvements in war rockets, and in the methods and apparatus for applying the powers of rockets for the purpose of obtaining communication with vessels which are stranded, or in other situations of danger; also an improved instrument and method for accurately pointing mortars for throwing shells, which may likewise be used for firing shot from mortars, for the purpose of obtaining communication with ships.—Sealed 2nd August—6 months for inrolment.

To Samuel Sanderson Hall, of the Circus, Minories, in the city of London, for improvements in preserving certain vegetable substances from decay, being a communication from a foreigner residing abroad.—Sealed 3rd August—6 months for inrolment.

To Thomas Lund, of Cornhill, in the city of London, cutler, for his invention of improvements in extracting corks from wine and other bottles with steadiness, facility, and safety.—Sealed 3rd August—6 months for inrolment.

To Charles Bourjot, of Coleman-street, in the city of London, merchant, for his invention of improvements in the manufacture of iron.—Sealed 3rd August—6 months for inrolment.

To Robert William Sievier, of Henrietta-street, Cavendish-square, in the county of Middlesex, gentleman, for his

invention of certain improvements in looms for weaving, and in the mode or method of producing figured goods or fabrics.—Sealed 6th August—6 months for inrolment.

To Pierre Armand le Comte de Fontainemoreau, of Charles-street, City-road, in the county of Middlesex, for certain improvements in wool-combing, being a communication from a foreigner residing abroad.—Sealed 6th August—6 months for inrolment.

To Richard Rodda, of the parish of St. Austle, in the county of Cornwall, assay-master, for his invention of certain improvements in furnaces, fire places, and stoves, for the consumption of smoke and the saving of fuel, and in the mode of applying them to the generation of steam, the smelting of metals, and other works.—Sealed 7th August—6 months for inrolment.

To Eugene de Beuret, commonly called Viscount de Beuret, of 28, Mooregate-street, in the city of London, for certain improvements in the construction of railroads and tramroads, to facilitate the ascent and descent of hills and inclined planes, being a communication from a foreigner residing abroad.—Sealed 10th August—2 months for inrolment.

To Matthew Heath, of Furnival's Inn, in the city of London, gentleman, for improvements in preparing tobacco, and in making snuff, being a communication from a foreigner residing abroad.—Sealed 10th August—6 months for inrolment.

To Thomas Corbett, of Plymouth, in the county of Devon, gardener, for his invention of certain improvements in heating hot-houses and other buildings.—Sealed 10th August—6 months for inrolment.

David Cheetham, junior, of Staley-bridge, in the county of Cheshire, spinner, for his invention of certain improvements in the means of consuming smoke, and thereby

economising fuel and heat in steam engine or other furnaces or fire places.—Sealed 14th August—6 months for inrolment.

To Charles Wye Williams, of Liverpool, in the county of Lancaster, gentleman, for his invention of certain improvements in the process or the mode of purifying or preparing turpentine, rosin, pitch, tar, and other bituminous matters, whereby he increases their power of giving out light and heat, either when distilled or burnt as fuel.—Sealed 14th August—6 months for inrolment.

To William Henry Porter, of Russia-row, Milk-street, Cheapside, in the city of London, warehouseman, for his invention of improvements in anchors.—Sealed 15th August—6 months for inrolment.

To Ramsay Richard Reinagle, of No. 13, George-street, London University, Royal Academician, and the Chevalier George Robert D'Harcourt, of No. 6, King William-street, in the city of London, civil engineer, for their invention of certain improvements in the means of propelling canal boats, steamers, and other vessels.—Sealed 15th August—6 months for inrolment.

To George Robert D'Harcourt, of King William-street, in the city of London, civil engineer, for improvements in the manufacture of paper, being a communication from a foreigner residing abroad.—Sealed 15th August—6 months for inrolment.

To Charles Fox, of No. 28, Gloucester-place, Camden-town, in the county of Middlesex, engineer, for his invention of an improved arrangement of rails for the purpose of causing a railroad engine, carriage, or train, to pass from one line of rails to another.—Sealed 15th August—2 months for inrolment.

To Matthew Warton Johnson, of Buckingham-place, in the nty of Middlesex, sculptor and stone mason, for

his invention of improvements in the construction of coffins.—Sealed 15th August—6 months for inrolment.

To William Wainwright Potts, of Burslem, in the county of Stafford, china and earthenware manufacturer, for his invention of certain improvements in machines applicable to the printing or producing patterns in one or more colours or metallic preparations, to be transferred to earthenware, porcelain, china, glass, metal, wood, cloth, paper, papier machée, bone, slate, marble, and other suitable substances. —Sealed 21st August—6 months for inrolment.

To Samuel Stocker, of the city of Bristol, machinist, for his invention of improvements in chimneys for dwelling houses, and in apparatus for scraping, sweeping, or cleaning chimneys, and in the manufacture of such apparatus, and in the materials of which such chimneys are formed. —Sealed 21st August—6 months for inrolment.

To Richard Bradley, William Barrows, and Joseph Hall, of Bloomfield-ironworks, in the parish of Tifton, in the county of Stafford, iron-masters and co-partners, for their invention of an improved method or means of making iron. —Sealed 21st August—6 months for inrolment.

To Pierre Armand le Comte de Fontanemoreau, of Charles-street, City-road, in the county of Middlesex, gentleman, for his invention of certain new and improved metallic alloys to be used in various cases as substitutes for zinc, cast iron, copper, and other metals.—Sealed 23rd August—6 months for inrolment.

To George Dickenson, of Wood-street, Cheapside, in the city of London, paper manufacturer, for his invention of an improvement or improvements upon steam engines. —Sealed 23rd August—6 months for inrolment.

To Arthur Dunn, of Stamford-hill, in the county of Middlesex, gentleman, for his invention of certain improve-

ments in the manufacture of soap.—Sealed 24th August—6 months for inrolment.

To John Coope Haddan, of Baring-place, Waterloo-road, in the county of Surrey, gentleman, for his invention of certain improvements in the construction of carriages to be used on railways, and in the method of forming the same into trains.—Sealed 25th August—6 months for inrolment.

To Nicholas Troughton, of Broad-street, in the city of London, gentleman, for his invention of improvements in the process of obtaining copper from copper ores.—Sealed 21st August—6 months for inrolment.

To Jean Leandre Clement, of Rochfort, in the kingdom of France, but now of Janney's-hotel, Leicester-square, in the county of Middlesex, gentleman, for his invention of improvements for ascertaining and indicating the rate of vessels passing through the water.—Sealed 21st August—6 months for inrolment.

To Miles Berry, of Chancery-lane, in the county of Middlesex, patent agent and mechanical draftsman, for certain improvements in looms for producing metallic tissues, and also improvements in such tissues, applicable to the making of buttons, epaulets, tassels, and other purposes, for which gold and silver lace or braiding is commonly employed, and to the making of imitations of jewellery and other fancy articles, being a communication from a foreigner residing abroad.—Sealed 30th August—6 months for inrolment.

To William Dolier, of Liverpool, in the county of Lancaster, lecturer on education, for his invention of a certain durable surface or tablet for the purposes of receiving writings, drawings, or impressions of engravings or other devices capable of being printed, which surface may be ap-

plied for roads or pavements; and part of which invention may also be used as the means of strengthening or beautifying glass.—Sealed 30th August—6 months for inrolment.

To Joseph Davies, of Nelson-square, in the county of Surrey, gentleman, for his invention of a composition for protecting wood from flame.—Sealed 30th August—4 months for inrolment.

To John Grafton, of Cambridge, civil engineer, for his invention of certain improvements in the construction of retorts and other machinery for making gas from coal and other substances.—Sealed 30th August—6 months for inrolment.

To Henry Knill, of Eldon-place, Grange-row, Bermondsey, in the county of Surrey, for his invention of improvements in cleansing the bottoms of docks, rivers, and other waters.—Sealed 30th August—6 months for inrolment.

To Lawrence Heyworth, of Yewtree, near Liverpool, merchant, for his invention of a new method of applying steam power directly to the periphery of the movement wheel, for the purposes of locomotion both on land and water, and for propelling machinery.—Sealed 30th August—2 months for inrolment.

To John Earle Huxley, of Great Marlborough-street, John Earle Huxley, jun., of the same place, and John Oliver, of Dean-street, Soho, stove-makers, for their invention of improvements in certain description of stoves.—Sealed 31st August—6 months for inrolment.

To Joseph Curtis, of Stamford-street, Blackfriars-road, in the county of Surrey, civil engineer, for his invention of certain improved machinery and apparatus for facilitating travelling and transport on railways, parts of which are also applicable to other purposes.—Sealed 31st August—6 months for inrolment.

CELESTIAL PHENOMENA, FOR SEPTEMBER, 1838.

D.	H.	M.	
1			Clock after the sun, 0m. 4s.
—			☽ rises 6h. 5m. A.
—			☽ passes mer. 9h. 57m. A.
—			☽ sets 0h. 27m. M.
2	23	48	♅ in oppo. to the ☉
3	16	12	♅ in conj. with the ☽ diff. of dec. 1. 28. N.
4	6	18	Ecliptic oppo. or ○ full moon.
	10		☽ in Perigee.
5			Clock after the sun, 1m. 21s.
—			☽ rises 7h. 13m. A.
—			☽ passes mer. 0h. 41m. M.
—			☽ sets 6h. 40m. M.
	8	39	☿ stationary.
6	18	52	Pallas in conj. with ♀ diff. of dec. 17. 55. S.
9	6		☿ greatest hel. lat. S.
10			Clock after the sun, 3m. 2s.
—			☽ rises 9h. 1m. A.
—			☽ passes mer. 5h. 7m. M.
—			☽ sets 2h. 5m. A.
	10	9	☽ in □ or last quarter.
13	16	9	♂ in conj. with the moon, diff. of dec. 3. 54. S.
	21	29	Juno in □ with the ☉
15			Clock after the sun, 4m. 47s.
—			☽ rises 1h. 22m. M.
—			☽ passes mer. 9h. 36m. M.
—			☽ sets 5h. 3m. A.
	6	12	☿ in conj. with ♃ diff. of dec. 5. 18. S.
16	3	52	♀ in conj. with the ☽ diff. of dec. 2. 6. S.
18			☉ eclipsed inv. at Greenwich.
—			Mer. R. A. 11h. 44m. dec. 1. 44. S.
—			Venus R. A. 10h. 19m. dec. 11. 41. N.
—			Mars R. A. 8h. 21m. dec. 20. 34. N.
—			Vesta R. A. 6h. 28m. dec. 10. 49. N.
—			Juno R. A. 17h. 27m. dec. 10. 31. S.
18	—		Pallas R. A. 9h. 48m. dec. 2. 57. S.
	—		Ceres R. A. 10h. 34m. dec. 16. 38. S.
	—		Jupiter R. A. 11h. 55m. dec. 1. 41. N.
	—		Saturn R. A. 15h. 30m. dec. 17. 2. S.
	—		Georg. R. A. 22h. 47m. dec. 8. 37. S.
	—		Mercury passes mer. 23h. 48m.
	—		Venus passes mer. 22h. 32m.
	—		Mars passes mer. 20h. 32m.
	—		Jupiter passes mer. 0h. 7m.
	—		Saturn passes mer. 3h. 41m.
	7	38	☿ in conj. with the ☽ diff. of dec. 4. 20. S.
	8	45	Ecliptic conj. or ● new moon.
	15	18	♃ in conj. with the ☽ diff. of dec. 0. 39. N.
	21	45	☿ in inf. conj. with the ☉
	22		☽ in Apogee.
20			Clock after the sun, 6m. 52s.
	—		☽ rises 7h. 20m. M.
	—		☽ passes mer. 0h. 59m. A.
	—		☽ sets 6h. 23m. A.
22	4	24	♃ in conj. with the ☉
23	0	7	☉ enters Libra. Autumn commences.
	6	4	Ceres in conj. with ♀ diff. of dec. 6. 27. N.
	11	30	♄ in conj. with the ☽ diff. of dec. 6. 15. N.
	18		♀ in Perihelion.
25			Clock after the sun, 7m. 55s.
	—		☽ rises 1h. 30m. A.
	—		☽ passes mer. 4h. 48m. A.
	—		☽ sets 8h. 3m. A.
26	9	53	☽ in □ or first quarter.
27	6	6	☿ stationary.
28	5	30	☿ in the ascending node.
30			Clock after the sun, 9m. 55s.
	—		☽ rises 4h. 49m. A.
	—		☽ passes mer. 9h. 32m. A.
	—		☽ sets 0h. 58m. M.

The Eclipses of the Satellites of Jupiter are not visible this month, Jupiter being too near the Sun.

J. LEWTHWAITE, Rotherhithe.

END OF VOL. XII.